Ohio Agricultural Experiment Station.

BULLETIN 99.

WOOSTER, OHIO, JANUARY, 1899.

SUGAR BEET INVESTIGATIONS IN 1898.

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EXPERIMENT STATION, WOOSTER, OHIO.

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BULLETIN

OF THE

Ohio Agricultural Experiment Station.

NUMBER 99. JANUARY, 1899.

SUGAR BEET INVESTIGATIONS IN 1898.

BY A. D. SELBY.

The investigations of sugar beets for 1898, are, in a measure, a continuation of those of 1897, published in Bulletin 90 of this Station. In certain respects, however, the investigations of the past season have been directed toward a different end, namely: to determine what Ohio farmers can and will do in the matter of sugar beet production upon their respectivey soils. In this regard the year's experiments are contrasted with the previous ones, wherein samples of sugar beets were relied upon chiefly to furnish the information desired. For 1898 the grower himself must supply the more important facts. The difficulty, and if successful, the value of the work is enhanced by this plan, which was set forth in the following circular, mailed to all who had previously expressed an interest in sugar beet culture, and accompanied by a blank form of agreement to be signed and returned:

OHIO AGRICULTURAL EXPERIMENT STATION.

CIRCULAR NO. 14.

SUGAR BEET EXPERIMENTS IN 1898.

The Director of the Ohio Agricultural Experiment Station has received from Dr. H. W. Wiley, Chief of Division of Chemistry, U. S. Department of Agriculture, a circular letter from which we quote as follows:

"The Secretary of Agriculture has designated me to purchase high grade beet seeds for experimental purposes and to distribute these seeds to the agricultural experiment stations and in such other localities as may be deemed useful. In so far as possible, it will be the policy of the Department from now on to secure more definite experimental work than has heretofore been possible. To this end we prefer to send larger quantities of seeds to fewer persons, and only to those who will sign an agreement to prepare the soil, plant and cultivate the

beets, harvest and weigh them, and secure samples for analysis in accordance with specific directions, and as far as possible under supervision. I earnestly urge upon you, as director of an experiment station, to pursue the same line of investigation. Instead of sending promiscuously hundreds of packages of seeds to different parts of your state, secure pledges from twenty-five, fifty or more reliable farmers who will undertake, under your direction, to prepare the soil, plant, cultivate and harvest the beets in such a way as to obtain definite knowledge. It is expected that you will furnish the directions for conducting the work. It is suggested that not less than half an acre be cultivated by each person undertaking to do the work. It is also suggested that the seed be distributed so as to cover as nearly as possible all typical varieties of soil within your state. It is suggested also that in the distribution of the samples, thermal conditions and conditions of precipitation be taken into consideration. Two or three carefully conducted experiments on a typical soil and under typical meteorological conditions will give valuable and convincing data in regard to the possibilities of beet growing, data which intending investors in manufacture will consider and act upon. The various weather stations of the state will supply the necessary meteorological data, but in each locality where the experiment is carried on a general observation should be made of the character of the weather from day to day, or from week to week, and reported with the results of the cultural work. The particular data desired are as follows:

Character of soil, geological and otherwise;
Value of land per acre, at market rates and rental rates;
Cost of plowing and subsoiling;
Cost of preparation of soil for planting;
Cost of planting;
Cost of thinning and cultivating, and number of times cultivated, and how;
Cost of harvesting and topping;
Estimated cost of delivering beets to a factory at a distance of not more than six miles, or to a railway station at a distance of not more than six miles;
Exact area under cultivation;
Exact weight of beets cultivated;
Exact weight of beets after removal of the tops.

Wherever possible the area under cultivation and the weights obtained on harvesting should be checked by a representative of your station or a committee appointed by you. No guesswork of any kind should be allowed to enter into the report. Wages of the farmer and his team should be charged at the regular market rates.

It is earnestly requested that the greater part of the seeds which we send out at the present time shall be disposed of in the manner suggested."

In accordance with the instructions in the above letter the Experiment Station desires to receive the co-operation of farmers throughout the state who will undertake to cultivate at least half an acre each of sugar beets, using seed to be furnished free of cost by the Station, and carrying out the cultural and other directions which follow:

SOIL AND MANURING.

In selecting a soil for sugar beets the extremes of thin, white clay and black muck should be avoided. A soil which is somewhat sandy is preferable, but any rich loam may be expected to give a good return. It is imperative that the soil be well drained and it must be of such a nature that it may be deeply worked. A hard pan a few inches down will produce prongy beets which the factories will reject. When possible the land should be clover sod, both because of the manurial effect of the clover crop and because of the greater ease of subduing weeds on such a soil. Land that has been well manured for a previous crop is better than that freshly manured. Any complete commercial fertilizer may be used freely, if applied broadcast.

PLOWING.

The land should be plowed as early as possible in the spring and should be worked 12 to 15 inches in depth. If the subsoil is of such a nature that it is objectionable to work to this depth with a turning plow, then a subsoiler may be used, but many of the alluvial and gravelly soils in the middle and western parts

of the state may be safely broken to this depth by running two breaking plows in the same furrow. Much of the earth thrown up by the second plow will fall back in the furrow.

HARROWING.

The soil should be harrowed within a few hours after plowing and re-harrowed at intervals of a week or ten days until the beets are planted. Under no circumstances must the soil be broken up loose and left to dry out. Moisture is more important in beet growing than manure or fertility. The best implement to follow the plow is the smoothing harrow. If the surface is pulverized and leveled with this implement it may be more deeply worked at convenience. When ready to plant it may be cut deeply with the disk harrow, then smoothed and rolled if dry enough, but it should be gone over again with the smoothing harrow either just before or just after planting.

PLANTING.

The planting should be done as soon as the ground can be got in proper condition. Beets will stand considerable cold and therefore should be planted before time for planting corn. The earlier the planting the larger the probable yield of sugar.

The beets should be planted in rows not exceeding two feet apart — twenty inches is a better distance. If the rows are wide apart the beets grow too large, and large beets always show relatively less sugar than small or medium sized ones. The most common fault found in the beets sent in for sampling in 1897 was that they were too large. (See Bulletin 90.) A large tonnage of beets may be secured by wide planting, but where a large yield of sugar is desired close planting is imperative. Experience has shown that for best returns in sugar the beets should not exceed about two pounds in average weight. There are 43,560 square feet in an acre. If a stand can be secured of beets six inches apart in rows two feet apart, with an average weight of two pounds, the total yield will be over twenty tons per acre. This is a possible yield, but it can only be secured through close planting and great care to secure a complete stand.

Where a garden seed drill is obtainable it is a suitable implement for planting beet seed. In default of such a drill a force-feed wheat drill may probably be used, by stopping part of the runs. For machine planting 12 to 15 pounds of seed will be required for an acre. Half this quantity of seed will be sufficient if it is planted by hand. A convenient arrangement for hand planting is a tin tube about three-fourths inch in diameter and three feet long, expanded at one end into a funnel two or three inches in diameter. The seeds are dropped into this funnel and the tube carries them to their place in the furrow without interference from the wind. The seed should be covered about half an inch deep, if the soil is in good condition; but if the soil is dry and rain uncertain it may be covered deeper. It is well to firm the earth over the seed, but a dashing rain may cause a crust to form, through which it will be difficult for the young plant to penetrate. Such a crust should be broken with a Breed's weeder or a light harrow. As the seed germinates slowly considerable labor in cultivation may be saved by working lightly with Breed's weeder or harrow before the beets appear above the ground, whether there be a crust or not.

CULTIVATION.

In the early cultivation the ground should be stirred as deeply as possible. To accomplish this without covering the plants the ideal implement would be a cultivator with numerous long, hooked teeth, not more than an inch wide, one which might be called a cross between a harrow and a cultivator. Such

cultivators are now on the market. After the beets have become larger a cultivator with broader shovels may be used in order to cut the weeds more effectually, but deep working of the soil should be carefully avoided after it has become filled with the feeding roots of the crop.

The after cultivation should consist in keeping the ground free of weeds and keeping the surface loose, both points being necessary to the preservation of the soil moisture.

THINNING.

When the young plants have 4 leaves they should be thinned so as to stand 4 to 6 inches apart in the rows. They may be roughly thinned by chopping out part of the plants with a narrow hoe, but the final thinning must be done by hand; leaving, of course, the most vigorous plants. The interspaces should not exceed 8 inches. When there are wide gaps they may be filled in by transplanting, but transplanted beets are apt to be prongy and inferior. One advantage in hand planting is that it lightens the labor of thinning.

HARVESTING.

The ripening of the beets is indicated by the leaves turning yellow and this will not ordinarily begin until October. The beet will stand considerable frost, and the percentage of sugar increases up to full maturity. In harvesting, the tops may be scalped off with a sharp hoe, as they stand in the row, or the beets may be dug first and topped with a corn knife as they are loaded into wagons.

In digging, unless a special implement for this purpose is at hand, turn a furrow next to the outside row of beets, running the landside of the plow close to the beets; they may then be easily pulled out, or thrown out with a spading fork, and the next row loosened in the same manner.

Instructions for sampling will be sent at a later date and full directions for storing will be found in Bulletin 75 of this Station.

INFORMATION REQUIRED.

The letter from Dr. Wiley indicates the points upon which information is desired. Blanks will be furnished with the seed upon which entries may be made as the work progresses. Farmers who are willing to undertake this experiment are requested to sign the enclosed agreement and return it to the Experiment Station.

Wooster, Ohio, February 14, 1898.

In response to this explanation of method 233 agreements to grow various areas of sugar beets were signed and returned to the Station. The areas stated by these several growers were widely divergent, being from 1-10 to 2 acres in extent. Eight additional agreements were signed and seed furnished by the Central Ohio Beet Sugar Growers' Society, of Springfield, Ohio. It was decided to send not more than 12 pounds of sugar beet seed to any one grower and that this amount should be placed on one acre of land. Accordingly, few single areas greater than one acre were planted with this seed. The names of the growers, together with address and area grown appear in tables VI and VII. In addition, small packages of seed, usually one-half pound each, were sent to 113 other farmers in the state. It will be observed that 346 different growers were supplied with sugar beet seed through the distributions from the Station. A large number received sugar beet seed from other sources. A considerable number of applications for seed were received after our supply became exhausted. With each package of seed from the Station, an additional copy of the instructions for growing embodied in the circular before quoted, and a copy of the following blank report, were sent by mail under separate cover:

OHIO AGRICULTURAL EXPERIMENT STATION.

CO-OPERATIVE SUGAR BEET EXPERIMENTS IN 1898.

Report of Experimenter No——.

1. Location and exposure of land on which beets are grown: 1. County, ; 2. Township, ; 3. Range ; 4. Section, ; 5. Exposure and Slope.
2. Character of soil: 1. Underlying rocks and depth below surface. Rock fragments on land.
   2. Soil description: (clay, loam, sandy and various graduations; subsoil, hardpan, etc.)
   3. Character as shown by the original growth of trees and shrubs upon the land.
3. Value of land per acre at current market rates. Cash rental rates per acre for similar land.
4. What crop was grown on the field in 1897?
5. Manuring given the land in 1897 or 1898, how and when applied.
6. Date and depth of plowing and what character of plows used.
7. Hours time of man and team required in plowing and sub-soiling.
8. Further time of man and team in preparation for planting. State also manner in which this preparation was made.
9. Date, manner and distance planted.
10. Hours time required in planting.
11. Varieties planted.
12. Cultivation given, if any, before beets came up.
13. Date and time consumed in thinning. How done. Distance apart after thinning.
14. Size of area in beets. Give exact length and width.
15. Hours of time of man in hoeing and time of man and team in cultivation, also number of times cultivated and how.
16. Date and time required in harvesting and topping.
17. Estimated cost of delivering beets to a factory at a distance of not more than six miles, or to your nearest railway station, if not more than six miles distant. Give distance of station.
18. Exact weight of beets and tops.
19. Exact weight of beets after topping.
20. Calculated yield of topped beets per acre.
21. Please add on blank spaces any further observations or information on beet growing.

22. Name.
23. Post Office.
    County.

Please fill out the above blank as the work is done, and as soon as the beets have been harvested and weighed, mail to

CHAS. E. THORNE,
Special Agent U. S. Department of Agriculture,
Ohio Experiment Station, Wooster, O.

In this connection, especially in view of the considerable number of failures wherein seed did not come up or a poor stand of beets was secured, it is well to remind all that this failure was in no wise due to poor quality of seed. The seed came to the Station in the original packages, through the United States Department of Agriculture; the Vilmorin from Vilmorin, Andrieux & Cie, Paris, and the Klein-Wanzlebener from Gebrüder Dippe, Quedlinburg. It was tested in our laboratories and met all reasonable standards, as will be seen from the subjoined note. The discussion of causes of failure will be taken up elsewhere.

THE SEASON'S CLIMATE.

In Bulletin 90 the writer was able to give an epitome of Ohio climate for the summer months, through the kindly aid of H. W. Richardson, then Section Director of the Weather Service, Columbus, Ohio. Below I have compiled the normal temperatures and rainfall, compared with those of 1898, for the sections of Ohio, and for the entire state. These are from the Ohio Weather Reports:

NOTE.— RESULTS OF LABORATORY TEST OF THE SUGAR BEET SEED USED FOR THESE EXPERIMENTS.

	Kleinwanzlebener— 1st test.	Kleinwanzlebener— 2nd test.	Vilmorin's Improved.
No. seed balls planted	100	100	100
" sprouts, end 7 days	163	193	176
" " " 9 "	192	232	183
" " " 14 "	196	235	196
No. seed balls germinated at end of 14 days	84	93	87
No. with 4 or more sprouts	10	14	4
" " 3 " "	23	26	24
" " 2 " "	29	28	37
" " 1 sprout	22	25	22
Weight of Seed Balls.			
Moisture at 100° C	11.75%		13.87%
2 grammes contain	98 balls.	78 balls.	94 balls.

Test made February and March, 1898, by L. M. Bloomfield.
The ordinary standard of germination is 140 sprouts from 100 seed balls.

TABLE I.—NORMAL MEAN TEMPERATURES AND RAINFALL COMPARED WITH THE MEAN TEMPERATURE AND RAINFALL OF OHIO IN 1898.

Month.	Southern section.				Middle section.				Northern section.				Entire State.			
	Rainfall—inches.		Temperature.		Rainfall—inches.		Temperature.		Rainfall—inches.		Temperature.		Rainfall—inches.		Temperature.	
	Normal.	1898.	Normal.	1898.	Normal.	1898.	Normal.	1898.	Normal.	1898.	Normal.	1898.	Normal.	1898.	Normal.	1898.
May	3.70	3.90	62.4	63.4	4.12	4.67	59.4	60.4	4.14	3.74	58.2	59.2	3.98	4.10	60.0	61.0
June	3.92	2.52	72.0	74.0	3.71	2.86	70.1	71.6	3.65	3.20	69.0	70.0	3.76	2.86	70.4	71.9
July	3.57	4.19	74.7	77.7	3.79	3.64	73.0	75.8	3.38	4.11	72.0	74.5	3.58	3.98	73.2	76.0
August	3.14	4.86	73.1	75.5	2.69	4.33	71.9	73.0	2.70	4.32	69.7	71.9	2.85	4.50	71.3	73.5
September	2.35	2.53	67.9	70.3	2.58	2.16	65.6	68.1	2.88	3.00	62.3	64.9	2.52	2.56	65.3	67.8
October	1.91	3.19	51.1	53.1	2.05	3.82	51.6	53.6	2.17	4.16	50.7	52.7	2.04	3.72	51.1	53.1

It will be observed that the temperatures for the season are conspicuously above normal; while, excepting June, the rainfall is also above normal. This excess of rainfall is strongly marked in August and October.

On the whole, if we except dashing rains, unfavorable to seeding, and showery, hot weather, favorable to the ravages of the leaf-spot fungus of the beet, *Cercospora beticola* Sacc., the summer of 1898 does not appear to have been less favorable to the culture of sugar beets than the normal summer of Ohio, unless in the higher temperature prevailing.

It is the northern and northeastern parts of the state, wherein the most favorable theoretical conditions prevail, and it does not appear, from the analyses which follow, that field tests have in any manner failed to confirm the indications of the summer isotherms and the normal rainfall.

The following tables exhibit the results of analyses and cultural data of the co-operative experiments for 1898. The data as to culture are derived from the growers, while the analyses of sugar beet samples were for the larger part made by Dr. H. W. Wiley, of the Division of Chemistry of the United States Department of Agriculture. (All numbers below 2000 were analyzed at Washington). Quite a number of beet analyses were made in this Department, by Mr. J. W. T. Duvel. Duplicate copies of analyses made by Dr. Wiley were forwarded as completed and it seems best, with this open acknowledgment, to include all results in these tables.

[1] Wiley, Dr. H. W., Special Report on the Beet and Sugar Industry in the United States, 1898. Map opp. p. 24 also p. 100.

TABLE II—DETAILED RESULTS OF SUGAR BEET

Laboratory Number.	Name of Grower.	Postoffice.	County.	Character of Soil.	Variety.
1034	Franklin Miller	Loudonville	Ashland	Gravelly loam.	*Klein Wanz.
1576	W. J. Read	Albion	"	Black loam	"
	Average, 2 samples.				
153	S. J. Mann	Lindenville	Ashtabula	Clay	"
1474	H. H. Schoville	Rock Creek	"	"	"
1578	John Ray	Simons	"	Sandy clay	"
1579	"	"	"	"	"
2006	S. J. Mann	Lindenville	"	Clay	"
2007	"	"	"	"	Vilmorin.
2017	"	"	"	"	Klein Wanz.
2038	"	"	"	"	"
2039	"	"	"	"	*Vilmorin.
2068	"	"	"	"	Klein Wanz.
2077	"	"	"	"	"
	Average, 11 samples.				
679	I. J. Gehrlich	Wapakoneta	Auglaize	Blk. sandy l'm	Vilmorin.
680	"	"	"	"	Klein Wanz.
	Average, 2 samples.				
2031	W. J. Kay	Sardinia	Brown	Sandy	Vilmorin.
2032	"	"	"	"	Klein Wanz.
	Average, 2 samples.				
220	H. C. Rogers	Mechanicsburg	Champaign.	Black loam	"
221	"	"	"	"	Vilmorin.
222	Wm. Hanna	Westville	"	Clay loam	Klein Wanz.
363	L. C. Clem	Carysville	"	Sandy loam	"
408	Geo. W. Notestine	Rosewood	"	Blk. clay loam	"
701	Geo. Licklider	Carysville	"	Sandy clay	Vilmorin.
824	L. C. Clem	"	"	Sandy loam	"
904	S. P. Castle & Co.	Urbana	"	Clay loam	"
932	J. T. Kite	Millerstown	"	Sand and clay	"
937	S. J. Barger	Crayon	"	Blk. clay loam	Klein Wanz,
943	J. T. Kite	Millerstown	"	Sand and clay	"
1007	J. J. McIntire	"	"	Black clay	"
1196	Geo. W. Notestine	Rosewood	"	Blk. clay loam	"
1373	Alby Kite	Millerstown	"	Clay loam	"
1389	"	"	"	"	Vilmorin.
1390	John G. Logan	Urbana	"	Clay	Klein Wanz.
1520	L. E. Pence	Millerstown	"	Sandy loam	Vilmorin.
1526	"	"	"	"	Klein Wanz.
2076	J. S. Van-ness	Mechanicsburg	"	Rd. grav. clay	"
2116	S. P. Castle & Co.	Urbana	"	Clay loam	Vilmorin.
2152	J. K. Cheetham	"	"	Black loam	Klein Wanz.
2162	S. O. Cheetham	"	"	"	"
	Average, 22 samples.				
146	R. L. Holman	Springfield	Clarke	Gravelly loam.	Vilmorin.
147	"	"	"	"	Klein Wanz.
187	Geo. Grieser	North Hampton	"	Black loam	"
357	Chas. R. Crain	Springfield	"	Black land	Vilmorin.
525	R. L. Holman	"	"	Clay	Klein Wanz.
526	"	"	"	"	Vilmorin.
584	David Hilt	Hustead	"	Cl'y clover sod	Klein Wanz.
766	J. A. Barnett	Springfield	"	Black loam	"
871	Geo. Grieser	North Hampton	"	Black clay	"
1231	Wm. Collier	Hustead	"	"	"
1232	J. B. Crain	Madriver	"	2nd bottom	"
1355	"	"	"	"	Vilmorin.
1518	C. T. Coates	Plattsburg	"	Black loam	Klein Wanz.
1519	"	"	"	"	Vilmorin.
2010	R. L. Holman & Sons	Springfield	"	Clay, 2nd bot.	Klein Wanz.
2011	" "	"	"	"	Vilmorin.
2020	" "	"	"	"	Klein Wanz.
2021	" "	"	"	"	Vilmorin.
2035	F. R. Packham	"	"	Clay loam	Klein Wanz.
2044	R. L. Holman & Sons	"	"	Clay	Vilmorin.

*By Klein Wanz. is meant Klein Wanzlebener Elite (Dippe.)
*By Vilmorin is meant Vilmorin's Improved (Vilmorin, Andrieux.)

INVESTIGATIONS IN OHIO FOR 1898.

Date of Planting.	Date of Harvesting.	Date of Sampling.	Date of Analysis.	Average Weight of Beets, ozs.	Sucrose in Beets, Per Cent.	Purity Coefficient.	Laboratory Number.
May 28	Oct. 31	Nov. 1	Nov. 3	14	12.0	79.7	1034
" 23	" 31	" 14	" 19	10	13.0	82.5	1576
				12	12.5	81.1	
June 1	Sept. 21	Sept. 22	Sept. 23	13	12.8	79.0	153
May 13	Nov. 14	Nov. 15	Nov. 16	12	14.4	84.0	1474
" 20	" 17	" 17	" 21	22	10.9	74.2	1578
" 20	" 17	" 17	" 21	17	11.5	75.7	1579
June 1	Sept. 12	Sept. 12	Sept. 15	19	11.9	76.6	2006
" 1	" 12	" 12	" 15	15	11.9	80.6	2007
" 1	" 21	" 22	" 24	16	14.1	79.6	2017
" 1	Oct. 1	Oct. 1	Oct. 4	15	9.7	74.5	2038
" 1	" 1	" 1	" 4	10	11.3	88.8	2039
" 1	" 9	" 10	" 14	14	14.2	85.6	2068
" 1	" 20	" 20	" 22	25	11.8	78.5	2077
				16.7	12.2	79.7	
May 14	Oct. 18	Oct. 19	Oct. 22	22	9.9	74.3	679
" 14	" 18	" 19	" 22	28	11.3	81.5	680
				25	10.6	77.9	
April 15	Sept. 23	Sept. 26	Sept. 26	21	9.8	76.8	2031
" 15	" 23	" 23	" 26	18	11.1	83.5	2032
				19.5	10.4	80.1	
May 1	Sept. 26	Sept. 26	Sept. 28	29	10.5	74.8	220
" 17	" 26	" 26	" 28	28	7.8	69.5	221
April 25	Sept. 26	" 26	" 28	15	11.5	81.2	222
May 10	" 3	" 4	Oct. 6	15	9.1	76.8	363
" 10	Oct. 3	Oct. 8	" 10	13	10.6	80.0	408
" 2-3	" 20	" 20	" 24	27	11.3	79.9	701
" 10	" 25	" 26	" 27	25	12.4	81.2	824
" 11	" 27	" 28	" 31	21	7.9	68.5	904
April 16	.....	" 28	" 31	9	10.9	84.0	932
May 31	Oct. 27	" 27	" 31	12	12.6	86.4	937
April 16	.....	" 28	" 31	11	9.4	73.3	943
May 1	.....	.....	Nov. 2	17	10.5	74.3	1007
" 10	Nov. 4	Nov. 4	" 7	26	10.0	74.5	1196
April 20	" 8	" 8	" 11	8	10.1	.....	1373
" 20	" 8	" 8	" 11	8	11.7	.....	1389
May 28	8	" 9	" 11	27	9.0	72.5	1390
April 28	" 14	" 14	" 17	10	11.8	80.5	1520
" 28	" 14	" 14	" 17	9	12.8	80.4	1526
May 15	Oct. 20	Oct. 20	Oct. 22	25	9.2	75.2	2076
" 11	" 27	" 27	Nov. 4	24	8.2	65.1	2116
.....	.....	.....	" 19	7	12.8	79.	2152
.....	.....	.....	" 25	17	11.5	81.7	2162
				17.4	10.5	76.9	
May 20	Sept. 21	Sept. 21	Sept. 23	12	13.6	76.5	146
" 20	" 21	" 21	" 23	14	15.7	80.5	147
" 16	" 22	" 23	" 26	37	10.6	73.5	187
" 14	Oct. 3	Oct. 4	Oct. 6	20	10.6	74.0	357
" 20	" 14	" 15	" 17	14	10.9	82.1	525
" 20	" 14	" 15	" 17	14	12.2	.....	526
" 17	" 17	" 15	" 19	22	11.0	76.8	584
June 1	24	" 24	" 26	21	7.7	67.0	766
May 16	26	" 26	" 29	46	8.7	74.8	871
" 17	Nov. 5	Nov. 5	Nov. 7	26	10.9	78.3	1231
" 14	" 3	" 3	" 7	23	11.4	80.0	1232
" 14	" 5	" 8	" 10	24	10.2	74.8	1355
" 14	" 15	" 15	" 17	14	11.5	83.5	1518
" 14	" 15	" 15	" 17	8	9.2	74.0	1519
" 20	Sept. 12	Sept. 12	Sept. 15	14	15.3	81.3	2010
" 20	" 12	" 12	" 15	12	15.4	82.2	2011
" 20	" 21	" 21	" 24	15	14.2	81.9	2020
" 20	" 21	" 21	" 24	12	15.2	80.8	2021
" 15	" 29	" 29	Oct. 1	15	12.6	81.6	2035
" 20	Oct. 1	Oct. 1	" 4	12	13.7	85.7	2044

TABLE II—DETAILED RESULTS OF SUGAR BEET

Laboratory Number.	Name of Grower.	Postoffice.	County.	Character of Soil.	Variety.
2045	R. L. Holman & Sons..	Springfield	Clarke.....	Clay	Klein Wanz.
2054	Chas. R. Crain.....	"	"	Blk. upland...	Vilmorin.
2074	R. L. Holman & Sons	"	"	Clay	Klein Wanz.
2075	" "	"	"	"	Vilmorin.
2090	John B. Patton.....	"	"	"	"
2119	R. L. Holman & Sons	"	"	"	Klein Wanz.
2120	" "	"	"	"	Vilmorin..
2167	" "	"	"	" 2nd bot.	"
2168	" "	"	"	" "	Klein Wanz.
	Average, 29 samples.				
298	T. C. Vearil.....	Williamsburg	Clermont ..	Limestone ...	"
308	"	"	" ..	" ..	Vilmorin.
2012	Frank Judd	May	" ..	Black clay....	Klein Wanz.
2013	"	"	" ..	"	Vilmorin.
2033	"	"	" ..	"	Klein Wanz.
2034	"	"	" ..	"	Filmorin.
2126	T. C. Vearil.....	Williamsburg	" ..	Blue soil.....	Klein Wanz.
2127	"	"	" ..	"	Vilmorin.
	Average, 8 samples.				
976	Fred Hussey	Memphis.....	Clinton.....	Clay loam.....	Klein Wanz.
	Average, 1 sample.				
307	F. M. Boring.....	Salineville.....	Columbiana	Mellow clay..	Klein Wanz.
803	"	"	"	" ..	"
	Average, 2 samples.				
957	G. W. Darling.....	Bluff	Coshocton..	Gravelly clay.	Vilmorin.
959	J. P. Darling.....	Nellie	" ..	Sandy loam...	"
960	"	"	" ..	" ...	Klein Wanz.
	Average, 3 samples.				
141	P. A. Spaid.....	Sulphur Springs...	Crawford ...	Black loam...	Klein Wanz.
278	Jacob Krauter, Jr.....	Bucyrus.....	" ...	" ...	Vilmorin.
947	"	"	" ...	" ...	Klein Wanz.
1075	B. F. Bender.....	"	" ...	Clay	"
1111	P. A. Spaid.....	Sulphur Springs...	" ...	Black loam....	"
1190	J. H. Cook.....	New Winchester...	" ...	Dark blue clay	"
1376	Wm. F. Smith.....	New Washington..	" ...	Black loam....	"
	Average, 7 samples.				
734	W. J. Wagner.....	Greenville	Darke	Clay loam.....	Vilmorin.
873	Jonas Dininger	"	"	Loose clay....	Klein Wanz.
1145	W. J. Wagner.....	"	"	Light clay l'm	"
1572	Jonas Dininger	"	"	Rich clay, blk.	"
	Average, 4 samples.				
535	J. J. Thieroff.....	Defiance	Defiance....	Blk. s'd& clay	Klein Wanz.
942	L. F. Blanchard.....	Ayersville.....	"	Clay	"
	Average, 2 samples.				
1564	J. B. Crow.....	Delaware	Delaware...	Clay	Klein Wanz.
2060	Joe. A. McClead.....	Ashley	" ...	Black loam...	"
2078	"	"	" ...	" ...	"
	Average, 3 samples.				
360	John Fitz	Venice	Erie	Black clay....	Klein Wanz.
361	"	"	"	" ...	Vilmorin.
718	A. G. Brownell.....	"	"	Sandy clay....	Klein Wanz.
753	Albert Campbell	"	"	Prairie loam..	"
882	Geo. Rirdon	Vermillion	"	Sandy loam...	"
919	E. B. Welsh.....	"	"	Blk. sw. m'ck	"
961	A. G. Brownell.....	Milan	"	Sandy	"
963	"	"	"	"	Vilmorin.
980	Ella H. Derby.....	Florence	"	Yellow sand..	"
994	Frank Rohda	Sandusky.....	"	Black clay....	"

INVESTIGATIONS IN OHIO FOR 1898—Continued.

Date of Planting.	Date of Harvesting.	Date of Sampling.	Date of Analysis.	Average Weight of Beets, ozs.	Sucrose in Beets, Per Cent.	Purity Coefficient.	Laboratory Number.
May 20	Oct. 1	Oct. 1	Oct. 4	18	13.4	86	2045
" 14	" 3	" 3	" 5	24	10.6	86.2	2054
" 20	" 14	" 14	" 20	18	14.3	81.5	2074
" 20	" 14	" 14	" 20	11	13.5	84.0	2075
" 18	" 28	" 28	" 29	20	9.7	75.6	2090
" 20	Nov. 1	Nov. 1	Nov. 4	20	12.8	82.3	2119
" 20	" 1	" 1	" 4	24	11.1	78.5	2120
" 20	" 10	Dec. 2	Dec. 3	17	12.5	88.0	2167
" 20	" 10	" 2	" 3	18	14.0	89.1	2168
				18.8	12.2	77.9	
May 19	Oct. 1	Oct. 1	Oct. 3	19	10.7	79.1	298
" 20	" 1	" 1	" 3	20	15.0	85.4	308
April 30	Sept. 12	Sept. 12	Sept. 15	18	11.2	74.2	2012
May 2	" 12	" 15	" 15	12	10.5	75.9	2013
April 30	" 22	" 22	" 26	14	11.9	79.6	2033
May 2	" 22	" 22	" 26	13	9.9	76.5	2034
" 19	Nov. 2	Nov. 2	Nov. 4	27	11.8	78.5	2126
" 20	" 2	" 2	" 4	26	9.4	72.8	2127
				18.6	11.3	77.7	
May 2	Oct. 31	Oct. 31	Nov. 1	37	7.4	65.0	976
				37	7.4	65.0	976
May 18	Oct. 1	Oct. 1	Oct. 3	15	13.9	78.9	307
" 18	" 24	" 25	" 27	23	12.5	81.9	803
				19	13.2	80.4	
May 22	Oct. 29	Oct. 29	Oct. 31	29	8.9	73.4	957
" 19	" 28	" 29	" 31	18	10.8	78.6	959
" 18	" 28	" 29	" 31	21	10.2	76.9	960
				22.7	10.0	76.3	
May 10	Sept. 20	Sept. 21	Sept. 23	24	11.1	79.1	141
" 10	" 29	" 29	Oct. 1	23	11.4	79.5	278
" 10	Oct. 28	Oct. 29	" 31	40	12.3	81.7	947
" 4	Nov. 2	Nov. 2	Nov. 5	35	9.0	70.4	1075
" 10	Oct. 31	Oct. 31	" 5	17	12.4	81.8	1111
" 28	Nov. 4	Nov. 4	" 7	11	12.4	81.2	1190
" 14	" 8	" 8	" 11	49	11.0	76.3	1376
				28.4	11.4	78.6	
May 16	Oct. 23	Oct. 24	Oct. 24	11	10.7	81.9	734
" 11	" 27	" 27	" 29	19	10.8	76.5	873
" 16	Nov. 3	Nov. 3	Nov. 5	16	8.8	73.2	1145
" 11	" 16	" 16	" 19	16	8.6	71.7	1572
				15.5	9.7	75.8	
May 4	Oct. 15	Oct. 15	Oct. 17	15	11.8	82.7	535
April 11	" 29	" 29	" 31	14	12.3	80.1	942
				14.5	12.0	81.4	
June 4	Nov. 16	Nov. 17	Nov. 19	19	10.8	74.5	1564
May 5	Oct. 11	Oct. 11	Oct. 14	19	11.6	83.0	2060
" 5	" 21	" 21	" 22	20	11.0	78.9	2078
				19.3	11.1	78.8	
May 5	Oct. 4	Oct. 4	Oct. 6	26	10.8	80.0	360
" 5	" 4	" 4	" 6	22	11.8	82.1	361
April 11	" 20	" 21	" 24	15	13.2	85.3	718
May 13	" 24	" 24	" 25	25	12.9	82.4	753
" 14	" 25	" 27	" 29	19	14.2	85.6	882
June 1	" 29	" 29	" 31	26	10.7	78.4	919
April 11	" 21	" 29	" 31	24	11.4	81.1	961
" 11	" 21	" 29	" 31	24	11.8	78.5	963
May 10	" 30	" 31	Nov. 1	33	10.8	75.5	980
" 15	" 26	" 31	" 2	14	10.3	76.1	994

TABLE II—DETAILED RESULTS OF SUGAR BEET

Laboratory Number.	Name of Grower.	Postoffice.	County.	Character of Soil.	Variety.
1000	Upton Darby	Vermillion	Erie	Black loam...	Klein Wanz.
1050	Chas. Kuhlemann	"	"	Hard clay.....	"
1117	Albert Campbell	Berlin Heights	"	Blk. pr. loam	"
1125	Ross L. Ransom	Sandusky	"	Black loam...	"
1140	"	"	"	" ...	Vilmorin.
1154	Geo. Baumhart	Vermillion	"	Sandy loam...	Klein Wanz.
1328	Nicholas Fisher	"	"	Blk. clay loam	"
1345	Francis Phillips	Shinrock	"	Sandy loam...	"
1446	F. Ortner	Castalia	"	Blk. l'my clay	Vilmorin.
1507	Ella H. Derby	Florence	"	High sand....	"
2022	John Mullaney	Sandusky	"	Sand and clay	Klein Wanz.
2049	"	"	"	"	"
2073	"	"	"	"	"
2141	John Fitz	Venice	"	Black loam...	Vilmorin.
2142	"	"	"	Black clay....	Klein Wanz.
2150	John Mullaney	"	"	Sand and clay	"
	Average, 26 samples.				
1596	Henry A. Miller	Millersport	Fairfield	Clay loam.....	Klein Wanz.
1652	Frank P. Miller	West Rushville	"	Sandy	Vilmorin.
	Average, 2 samples.				
1494	N. M. Parrett	Madison Mills	Fayette	Rd. clay subs'l	Mangel.
1498	"	"	"	"	"
	Average, 2 samples.				
271	N. Wilhelm	Alton	Franklin	Black loam...	Klein Wanz.
1031	J. W. Wolpert	Hilliards	"	Red clay.....	"
1641	"	"	"	Chocolate clay	"
2103	Samuel Taylor	Pleasant Corners	"	Limestone s'l.	"
2104	"	"	"	Limest'e clay.	Vilmorin.
2105	"	"	"	Black clay....	"
2106	"	"	"	"	Klein Wanz.
	Average, 10 samples.				
536	Thos. H. Fraker	Delta	Fulton	Heavy clay....	Vilmorin.
537	"	"	"	"	Klein Wanz.
632	T. J. Halsey	"	"	Black loam...	"
861	F. S. Wolcott	"	"	Yellow sand..	"
863	"	"	"	Brown sand...	Vilmorin.
1004	E. H. Patterson	Emery	"	Sandy	Klein Wanz.
1230	C. A. Miller	Delta	"	Light sand....	"
1290	T. J. Halsey	"	"	Sandy loam...	"
2002	F. S. Wolcott	"	"	Sandy	Vilmorin.
2003	"	"	"	"	Klein Wanz.
2025	"	"	"	Yellow sand..	Vilmorin.
2026	"	"	"	Sandy loam...	Klein Wanz.
2042	"	"	"	Yellow sand..	"
2043	"	"	"	Dark sand....	Vilmorin.
2063	"	"	"	Brown sand...	"
2064	"	"	"	" ...	Klein Wanz.
2110	Thos. H. Fraker	"	"	Heavy clay...	Vilmorin.
2111	"	"	"	" ...	Klein Wanz.
2117	F. S. Wolcott	"	"	Brown sand...	Vilmorin.
2118	"	"	"	Yellow sand..	Klein Wanz.
2144	"	"	"	Black sand....	Vilmorin.
2145	"	"	"	" ...	Klein Wanz.
2146	"	"	"	Yellow sand..	"
2147	"	"	"	" ..	Vilmorin.
2151	Thos. E. Goodwin	"	"	Black sand....	"
	Average, 25 samples.				
438	Lucinda E. Doup	Claridon	Geauga	Sand loam ...	Vilmorin.
804	"	"	"	" ...	"
	Average, 2 samples.				
435	John D. Mills	Spring Valley	Greene	Sand, clay l'm	Vilmorin.
436	A. B. Garringer	Jamestown	"	Black and clay	Klein Wanz.
618	O. M. Conner	"	"	Black loam....	"
989	John C. Andrew	Xenia	"	Clay loam.....	Vilmorin.
1257	O. M. Conner	Jamestown	"	Black loam...	Klein Wanz.
1367	E. N. Jacobs	Trebein	"	New ground..	"
1372	"	"	"	Dark s'dy l'm	"

INVESTIGATIONS IN OHIO FOR 1898—Continued.

Date of Planting.	Date of Harvesting.	Date of Sampling.	Date of Analysis.	Average Weight of Beets, ozs.	Sucrose in Beets, Per Cent.	Purity Coefficient.	Laboratory Number.
May 19	Oct. 31	Oct. 31	Nov. 2	23	12.0	78.8	1000
" 10	Nov. 2	Nov. 2	" 4	18	12.3	80.6	1050
" 12	" 1	" 1	" 5	28	12.2	78.5	1117
" 25	" 2	" 3	" 5	25	12.4	79.3	1125
" 25	" 2	" 3	" 5	30	9.8	70.1	1140
" 15	" 2	" 3	" 5	25	10.5	73.3	1154
" 12	" 7	" 8	" 10	34	12.6	79.7	1328
" 12	" 8	" 8	" 10	10	11.2	79.7	1345
" 7	" 10	" 10	" 14	22	12.4	82.8	1446
" 10	" 14	" 15	" 16	18	13.8	85.8	1567
" 14	Sept. 21	Sept. 21	Sept. 24	19	13.5	83.5	2022
" 14	Oct. 1	Oct. 1	Oct. 4	18	12.0	82.4	2049
" 14	" 17	" 17	" 20	19	13.4	84.4	2073
" 5	Nov. 11	Nov. 11	Nov. 15	26	10.7	80.7	2141
" 5	" 11	" 11	" 15	16	12.3	83.2	2142
" 14	" 11	" 11	" 17	20	14.2	83.7	2150
				22	12.0	80.5	
May 15	Nov. 18	Nov. 19	Nov. 21	13	12.4	78.8	1596
June 4	" 22	" 23	" 25	12	12.0	78.8	1652
				12.5	12.2	78.8	
May 8	Nov. 13	Nov. 13	Nov. 16	46	11.0	78.9	1494
" 28	" 13	" 13	" 16	46	9.7	72.9	1498
				46	10.3	75.9	
May 9	Sept. 29	Sept. 29	Sept. 30	16	10.0	74.0	271
" 13	Oct. 31	Oct. 31	Nov. 3	8	13.8	80.6	1031
June 5	Nov. 20	Nov. 21	Nov. 20	28	9.7	68.5	1641
May 1	Nov. 1	" 2	" 2	20	11.6	79.7	2103
" 1	" 1	" 2	" 2	19	11.5	79.6	2104
" 1	" 1	" 2	" 2	30	10.7	79.5	2105
" 1	" 1	" 2	" 2	26	10.8	80.9	2106
				21	11.2	76.5	
April 28	Oct. 14	Oct. 14	Oct. 17	17	12.7	81.7	536
" 28	" 14	" 14	" 17	19	12.2	83.1	537
May 15	Oct. 8	" 8	" 20	29	11.4	78.9	622
" 11	" 26	" 26	" 28	27	12.6	81.1	861
" 11	" 26	" 26	" 28	25	12.1	82.5	863
" 2-3	" 31	" 31	Nov. 2	40	12.3	79.2	1004
" 6	Nov. 5	Nov. 5	" 7	18	11.0	74.8	1230
" 2	" 3	" 7	" 8	20	11.6	79.7	1290
" 11	Sept. 12	Sept. 12	Sept. 15	19	13.8	81.9	2002
" 11	" 12	" 12	" 15	19	13.3	83.3	2003
" 11	" 22	" 22	" 24	21	12.5	75.9	2025
" 11	" 22	" 22	" 24	21	13.2	81.8	2026
" 11	Oct. 1	Oct. 1	Oct. 4	20	12.5	82.0	2042
" 11	" 1	" 1	" 4	20	13.4	85.5	2043
" 11	" 10	" 10	" 14	19	13.5	84.0	2063
" 11	" 10	" 10	" 14	19	14.3	86.2	2064
April 28	" 31	" 31	Nov. 2	13	14.3	88.8	2110
" 28	" 31	" 31	" 2	18	14.6	86.5	2111
May 11	Nov. 1	Nov. 1	" 4	17	12.6	84.2	2117
" 11	" 1	" 1	" 4	20	13.0	83.0	2118
" 11	" 11	" 11	" 17	32	13.6	85.6	2144
" 11	" 11	" 11	" 17	30	13.9	85.4	2145
" 11	" 11	" 11	" 17	28	14.3	86.7	2146
" 11	" 11	" 11	" 17	22	14.9	89.2	2147
April 16	Nov. 5	" 11	" 17	32	13.3	84.3	2151
				22.4	13.1	83.0	
May 10	Oct. 10	Oct. 10	Oct. 12	30	9.4	73.3	438
" 10	" 25	" 25	" 27	24	13.2	84.8	804
				27	11.3	79.0	
May 5	Oct. 10	Oct. 10	Oct. 12	27	8.0	71.2	435
" 19	" 10	" 10	" 12	27	7.6	65.6	436
" 19	" 18	" 18	" 20	10	9.1	74.4	618
" 13	" 31	" 31	Nov. 2	19	8.0	66.7	989
" 10	Nov. 5	Nov. 5	" 7	15	10.0	75.0	1257
June 20	" 8	" 9	" 10	21	11.5	79.6	1367
" 21	" 8	" 8	" 11	24	9.1	72.7	1372

TABLE II—DETAILED RESULTS OF SUGAR BEET

Laboratory Number.	Name of Grower.	Postoffice.	County.	Character of Soil.	Variety.
1396	Jos. Schoenherr	Fairfield	Greene	Black loam	Vilmorin.
1397	"	"	"	"	Klein Wanz.
1692	John C. Andrew	Xenia	"	Clay loam	"
2133	E. N. Jacobs	Trebein	"	New ground	"
2134	"	"	"	Blk. sandy l'm	"
	Average, 12 samples.				
1455	L. P. Roemer	Washington	Guernsey	Black loam	Vilmorin.
1463	"	"	"	"	Klein Wanz.
	Average, 2 samples.				
160	G. W. Powell	Findlay	Hancock	Clay loam	
446	Harry Powell	"	"	Black. loam, limestone	Vilmorin.
2000	G. W. Powell	"	"	Clay loam	Reddish.
2001	"	"	"	"	White.
2018	"	"	"	"	Vilmorin.
2019	"	"	"	"	Klein Wanz.
2055	"	"	"	"	
2056	"	"	"	"	
2079	"	"	"	Loamy clay	"
2080	"	"	"	"	Vilmorin.
2101	"	"	"	"	"
2102	"	"	"	Clay loam	Klein Wanz.
	Average, 12 samples.				
235	Michael Long	Ada	Hardin	Clay loam	"
236	"	"	"	Creek bottom.	"
279	N. S. Martin	"	"	Clay loam	"
1590	Michael Long	"	"	"	"
1597	"	"	"	Creek bottom.	"
	Average, 5 samples.				
799	Simon Wagoner	Colton	Henry	Black loam	Vilmorin.
802	"	"	"	"	Klein Wanz.
906	J. M. Robinson	McClure	"	Blk. sandy l'm	"
909	"	"	"	"	Vilmorin.
918	Wm. Brooks	Okolona	"	Blk. loam clay	"
940	E. L. Emery	Grelton	"	Sandy loam	Klein Wanz.
968	"	"	"	Blk. sand l'm	Vilmorin.
1052	R. J. Shoemaker	Deshler	"	Black loam	Klein Wanz.
1098	"	"	"	"	Vilmorin.
1586	J. W. Bowers	West Hope	"	Blk. s'd & clay	"
1598	"	"	"	"	Klein Wanz.
2029	Charles Lang	Colton	"	Black sand	Vilmorin.
2030	"	"	"	"	Klein Wanz.
2057	"	"	"	"	"
2058	"	"	"	"	"
	Average, 15 samples.				
652	I. A. McCoy	Lodore	Highland	Clay loam	Vilmorin.
2004	"	"	"	"	"
2005	"	"	"	"	Klein Wanz.
2027	"	"	"	"	Vilmorin.
2028	"	"	"	"	Klein Wanz.
2047	"	"	"	"	"
2048	"	"	"	"	Vilmorin.
2059	"	"	"	"	Klein Wanz.
2082	"	"	"	"	Vilmorin.
2083	"	"	"	"	"
2096	"	"	"	"	Klein Wanz.
2097	"	"	"	"	Vilmorin.
2138	"	"	"	"	Klein Wanz.
	Average, 13 samples.				
406	G. B. Painter	Benton	Holmes	Black loam	"
596	Mel. Marquis	Holmesville	"	Sandy loam	"
	Average, 2 samples.				

INVESTIGATIONS IN OHIO FOR 1898—Continued.

Date of Planting.	Date of Harvesting.	Date of Sampling.	Date of Analysis.	Average Weight of Beets, ozs.	Sucrose in Beets, Per Cent.	Purity Coefficient.	Laboratory Number.
April 29	Nov. 8	Oct. 10	Nov. 12	16	10.8	76.0	1396
" 29	" 8	" 10	" 12	8	11.1	77.0	1397
May 13	Dec. 2	Dec. 2	Dec. 6	13	12.0	79.2	1692
June 20	Nov. 8	Nov. 8	Nov. 12	28	11.1	82.4	2133
" 20	" 8	" 8	" 12	32	8.6	70.9	2134
				20	9.7	74.2	
May 28	Nov. 12	Nov. 12	Nov. 14	20	11.6	78.7	1455
" 28	" 12	" 12	" 14	20	11.0	76.8	1463
				20	11.3	77.7	
May 4	Sept. 22	Sept. 22	Sept. 24	33	8.6	66.7	160
" 17	Oct. 10	Oct. 10	Oct. 12	16	8.5	71.8	446
" 4	Sept. 12	Sept. 12	Sept. 15	17	7.9	68.	2000
" 4	" 12	" 12	" 15	17	11.1	76.8	2001
" 4	" 12	" 12	" 15	20	12.5	83.5	2018
" 4	" 12	" 12	" 15	22	12.0	79.7	2019
" 4	Oct. 5	Oct. 5	Oct. 8	17	12.0	83.4	2055
" 4	" 5	" 5	" 8	17	12.0	84.0	2056
" 4	" 20	" 20	" 22	18	11.2	80.8	2079
" 4	" 20	" 20	" 22	17	11.8	81.6	2080
" 4	" 31	" 31	Nov. 2	24	12.7	84.9	2101
" 4	" 31	" 31	" 2	24	11.2	83.7	2102
				20.4	10.9	78.7	
May 5	Sept. 26	Sept. 27	Sept. 29	34	11.7	77.4	235
" 19	" 26	" 27	" 29	24	11.3	77.3	236
April 30	" 29	" 29	Oct. 1	33	11.9	79.6	279
May 5	Nov. 19	Nov. 19	Nov. 19	30	10.6	77.6	1590
" 19	" 19	" 19	" 21	26	13.8	82.8	1597
				29.4	11.9	78.9	
May 15	Oct. 25	Oct. 23	Oct. 26	38	8.0	66.1	799
" 15	" 25	" 23	" 27	34	9.4	76.2	802
" 6	" 27	" 27	" 31	26	12.0	76.8	906
" 6	" 27	" 27	" 31	21	14.2	88.2	909
" 25	" 25	" 29	" 31	19	12.3	82.2	918
" 14	" 29	" 29	" 31	17	15.0	91.9	940
" 14	" 29	" 29	" 31	23	11.3	82.7	968
" 2	Nov. 2	Nov. 2	Nov. 4	41	11.9	79.1	1052
" 3	" 2	" 2	" 5	37	11.7	79.9	1098
" 6	" 18	" 18	" 21	33	11.8	77.5	1586
" 6	" 18	" 18	" 21	36	13.8	83.8	1598
" 10	Sept. 23	Sept. 23	Sept. 26	25	12.1	82.9	2029
" 10	" 23	" 23	" 26	22	9.6	72.8	2030
" 10	Oct. 11	Oct. 11	Oct. 14	13	8.4	67.2	2057
" 10	" 11	" 11	" 14	16	11.6	85.9	2058
				26.7	11.5	79.6	
April 30	Oct. 18	Oct. 18	Oct. 21	11	7.3	69.8	652
" 30	Sept. 12	Sept. 12	Sept. 15	8	11.4	78.9	2004
" 30	" 12	" 12	" 15	9	12.6	76.4	2005
" 30	" 22	" 22	" 24	9	12.2	83.7	2027
" 30	" 22	" 22	" 24	8	11.3	63.7	2028
" 30	Oct. 3	Oct. 3	Oct. 4	10	13.4	87.0	2047
" 30	" 3	" 3	" 4	11	9.2	74.6	2048
" 30	" 3	" 3	" 14	9	11.7	79.3	2059
" 30	" 3	" 3	" 14	7	11.9	82.3	2082
" 30	" 21	" 21	" 22	6	10.7	75.8	2083
" 30	" 21	" 21	" 22	6	12.2	79.0	2096
" 30	" 31	" 31	Nov. 2	16	10.6	77.2	2097
" 30	" 10	Nov. 10	" 12	17	12.8	81.3	2138
				8.9	11.7	78.6	
May 4	" 7	Oct. 7	Oct. 12	15	7.0	69.8	406
" 4	" 17	" 17	" 20	16	8.4	77.2	596
				12.5	7.7	73.0	

TABLE II—DETAILED RESULTS OF SUGAR BEET

Laboratory Number.	Name of Grower.	Postoffice.	County.	Character of Soil.	Variety.
164	F. C. Ball	Mt. Vernon	Knox	1st bottom, black loam..	Vilmorin.
791	E. W. Bell	"	"	Clay loam	"
793	"	"	"	"	Klein Wanz.
1137	A. Blue	Howard	"	Sandy loam	"
1416	Andrew J. Ball	Mt. Vernon	"	Sandy blk. l'm	"
1465	J. H. Keller	"	"	Clay	"
2015	Ben Ames	"	"	Clay loam	Vilmorin.
2016	"	"	"	"	Klein Wanz.
2140	"	"	"	"	Vilmorin.
2041	"	"	"	"	Klein Wanz.
2061	"	"	"	"	"
2062	"	"	"	"	Vilmorin.
2085	"	"	"	"	Klein Wanz.
2086	"	"	"	"	Vilmorin.
2128	"	"	"	"	"
2129	"	"	"	"	Klein Wanz.
	Average, 16 samples.				
1065	John Tawney	Mascot	Lake	Dark yel. sand	Vilmorin.
1072	A. Whipple	Madison	"	Clay loam	Klein Wanz.
1073	"	"	"	"	Vilmorin.
1577	W. L. Colby	"	"	Gravelly, sand	Klein Wanz.
1582	"	"	"	"	Vilmorin.
	Average, 5 samples.				
139	J. G. Hewlings	West Liberty	Logan	Clay	Klein Wanz.
140	"	"	"	"	Vilmorin.
580	C. M. Tapp	Rushsylvania	"	Blk. sandy l'm	Klein Wanz.
582	"	"	"	Red "	Vilmorin.
2052	J. G. Hewlings	West Liberty	"	Clay	"
2053	"	"	"	"	Klein Wanz.
	Average, 6 samples.				
808	C. E. Fox	Brighton	Lorain	Clay loam	Vilmorin.
1525	G. Pomeroy	Oberlin	"	Creek bottom.	Klein Wanz.
	Average, 2 samples.				
267	G. L. Betts	Fancher	Lucas	Sandy loam	Klein Wanz.
495	"	"	"	Sandy	Vilmorin.
613	G. W. Bamsey	Mitchaw	"	Mixed loam	"
899	A. R. Morgan	Maumee	"	Black loam	"
900	"	"	"	"	Klein Wanz.
1384	G. W. Bamsey	Mitchaw	"	Mixed loam	"
1535	D. G. Chandler	Sylvania	"	Clay	"
1537	"	"	"	"	Vilmorin.
1588	C. D. Kuntz	Ironville	"	Yellow clay	Klein Wanz.
1593	"	"	"	"	"
1594	"	"	"	"	Vilmorin.
1654	Y. Rakestraw	Whitehouse	"	Yellow sand	"
2099	E. L. Emery	Toledo	"		Klein Wanz.
2100	"	"	"		Vilmorin.
2155	C. D. Kuntz	Ironville	"		
2156	"	"	"		
2157	"	"	"		
	Average, 17 samples.				
484	J. H. Warner	Plain City	Madison	Black loam	Klein Wanz.
603	Thos. B. Wilson	London	"	Clay loam	"
1383	W. F. Cannon	Chenoweth	"	"	"
	Average, 3 samples.				
1531	J. S. Martin	North Lima	Mahoning	Light loam	"
951	Karl Krautter	Marion	Marion	Black soil	"
958	"	"	"	"	Vilmorin.
1087	E. E. Coulter	Kirkpatrick	"	Sandy & black	Klein Wanz.
1114	"	"	"	"	Vilmorin.

INVESTIGATIONS IN OHIO FOR 1898—Continued.

Date of Planting.	Date of Harvesting.	Date of Sampling.	Date of Analysis.	Average Weight of Beets, ozs.	Sucrose in Beets, Per Cent.	Purity Coefficient.	Laboratory Number.
May 26	Sept. 22	Sept. 22	Sept. 24	11	11.2	76.6	164
" 23	Oct. 24	Oct. 25	Oct. 26	10	11.0	78.4	791
" 23	" 24	" 25	" 26	7	10.8	76.0	793
" 1	Nov. 1	Nov. 2	Nov. 5	17	9.5	76.3	1137
" 26	" 10	" 11	" 12	17	10.6	76.7	1416
" 20	" 1	" 12	" 14	23	12.0	79.2	1465
April 20	Sept. 22	Sept. 22	" 24	21	11.3	79.3	2015
" 20	" 22	" 22	" 24	19	12.4	81.6	2016
" 20	Oct. 1	Oct. 1	Oct. 4	19	12.4	84.0	2040
" 20	" 1	" 1	" 4	20	12.2	80.0	2041
" 20	" 11	" 11	" 14	15	11.3	80.4	2061
" 20	" 11	" 11	" 14	14	10.7	82.5	2062
" 20	" 22	" 22	" 24	18	9.2	70.3	2085
" 20	" 22	" 22	" 24	17	12.5	84.6	2086
" 20	Nov. 1	Nov. 2	Nov. 4	21	9.5	74.6	2128
" 20	" 1	" 2	" 4	26	9.6	77.7	2129
				17.2	11.0	78.6	
May 9	Nov. 1	Nov. 2	Nov. 4	12	13.5	82.1	1065
" 4	" 2	" 2	" 4	18	14.4	86.3	1072
" 4	" 3	" 3	" 4	14	14.1	83.1	1073
April 29	" 17	" 17	" 19	8	12.8	83.3	1577
" 17	" 17	" 17	" 21	9	10.6	77.2	1582
				12.2	13.1	82.4	
May 3	Sept. 20	Sept. 20	Sept. 23	11	12.6	76.0	139
" 3	" 20	" 21	" 23	11	11.0	77.9	140
" 14	Oct. 17	Oct. 17	Oct. 19	27	10.0	77.2	580
April 16	" 17	" 17	" 19	25	9.3	77.2	582
May 3	" 3	" 3	" 5	12	10.9	77.8	2052
" 3	" 3	" 3	" 5	10	11.6	79.7	2053
				16	10.9	77.6	
May 3	Oct. 23	Oct. 24	Oct. 27	27	8.1	68.6	808
" 1	Nov. 15	Nov. 15	Nov. 17	12	10.9	74.2	1525
				19.5	9.5	71.4	
May 11	Sept. 28	Sept. 28	Sept. 30	38	9.2	70.8	267
" 11	Oct. 13	Oct. 13	Oct. 15	37	11.3	78.3	495
April 13	" 17	" 18	" 20	23	13.0	83.5	613
May 15	" 29	" 29	" 31	25	13.6	82.6	899
" 15	" 28	" 28	" 31	26	13.9	83.9	900
April 20	Nov. 9	Nov. 9	Nov. 11	22	12.0	78.8	1384
May 27	" 15	" 15	" 17	40	13.6	82.6	1535
" 27	" 15	" 15	" 17	24	10.9	78.3	1537
April 12	" 17	" 18	" 21	32	12.5	81.0	1588
" 12	" 17	" 18	" 21	45	10.6	74.5	1593
" 12	" 17	" 18	" 21	40	12.1	80.4	1594
May 30	Nov. 22	" 22	" 25	26	11.8	80.0	1654
.....	Oct. 31	Oct. 31	" 2	19	15.6	92.1	2099
.....	" 31	" 31	" 2	20	12.5	84.7	2100
.....	.....	.....	Nov. 19	42	15.5	88.5	2155
.....	.....	.....	" 19	46	13.6	84.6	2156
.....	.....	.....	" 19	46	13.6	83.6	2157
				32.4	12.7	81.1	
May 4	Oct. 12	Oct. 12	Oct. 14	13	12.6	83.1	484
June 4	" 17	" 18	" 20	28	11.0	80.0	603
.....	Nov. 9	Nov. 9	Nov. 11	20	6.0	62.7	1383
				20.3	9.9	75.3	
May 11	Nov. 14	Nov. 14	Nov. 17	14	10.8	78.6	1531
" 9	Oct. 28	Oct. 29	Oct. 31	30	11.9	78.7	951
" 9	" 28	" 29	" 31	23	10.6	75.2	958
" 18	Nov. 2	Nov. 2	Nov. 5	46	7.9	68.5	1087
" 18	" 2	" 2	" 5	36	9.7	72.9	1114

TABLE II—DETAILED RESULTS OF SUGAR BEET

Laboratory Number.	Name of Grower.	Postoffice.	County.	Character of Soil.	Variety.
1236	Sam'l Bolander	Kirkpatrick	Marion.....	Black, sandy.	Klein Wanz.
	Average, 5 samples.				
345	G. M. Brainerd.....	Windfall.....	Medina.....	Clay loam.....	"
1010	"	"	"	"	"
1042	Adam Leister	Abbeyville	"	Sandy loam...	"
	Average, 3 samples.				
455	Jos. Osterfeld	St. Henry.....	Mercer.....	Yellow clay...	"
630	H. Dahlinghaus	Carthagena	"	New ground..	"
631	"	"	"	" ..	"
1195	Fred Tobe	Saint Henry	"	.....	"
1300	Chas. Kneif	Stedeke	"	.....	
1380	John Stucke	St. Rose.....	"	Black	
1388	"	"	"	"	"
1428	Jacob Hess	Celina.....	"	Black pr. loam	"
1562	John H. Frahm.....	Stedeke	"	Black loam....	"
1580	John Haubert	Coldwater.....	"	"	
1694	H. B. Bennett.....	Montezuma.....	"	Clay mixed with sand...	
2163	J. O. Garrison.....	Celina.....	"	Blk. s'd loam	
2164	"	"	"	Clay mixed with sand...	
	Average, 13 samples.				
208	W. W. Crane.....	Tippecanoe City...	Miami.....	Brown loam..	"
681	.....	" " ...	"	" ..	Vilmorin.
1153	I. J. Merritt.....	Lena	"	Clay	Klein Wanz.
2014	W. W. Crane.....	Tippecanoe City...	"	Limestone soil	Vilmorin.
2046	"	" " ...	"	Brown loam..	Klein Wanz.
2067	"	" " ...	"	" ..	Vilmorin.
2081	"	" " ...	"	" ..	"
2092	J. W. Widney.....	Piqua	"	" ..	"
2093	"	"	"	.....	Klein Wanz.
2107	W. W. Crane.....	Tippecanoe City...	"	Dark br. loam	"
2153	"	" " ...	"	"	"
2154	"	" " ...	"	"	Vilmorin.
	Average, 12 samples.				
541	Jos. W. Harris.....	Germantown	M'ntgomery	Clay loam.....	"
785	"	"	"	"	"
2072	A. Shirer	Dayton.....	"	.....	
	Average, 3 samples.				
469	Clyde Parmiter	McConnellsville...	Morgan.....	Clay	Klein Wanz.
1347	H. C. Murphy.....	Chester Hill.....	"	Sandy loam...	Vilmorin.
1352	"	"	"	...	Klein Wanz.
	Average, 3 samples.				
167	W. H. Ramey.....	Mt. Gilead	Morrow.....	Clay	
223	C. H. Turner.....	Fulton	"	Sandy loam...	"
	Average, 2 samples.				
178	Jos. L. Love.....	Dresden.....	Muskingum	Sandy loam...	Vilmorin.
189	"	"	"	" ...	Klein Wanz.
284	D. H. Coleman.....	Fultonham	"	Clay	"
1462	"	"	"	"	"
	Average, 4 samples.				
375	J. W. Pettay.....	Sarahsville	Noble.....	Black loam...	"
341	John H. Cutcher.....	Oak Harbor.....	Ottawa.....	Black	"
342	"	"	"	Black pr. loam	Vilmorin.
764	L. B. Bailey.....	Curtice	"	Clay subsoil...	"
870	W. W. Whitten.....	Rocky Ridge.	"	Black muck and clay	Klein Wanz.
892	Carl Knopp	Graytown.....	"	Black gravel..	

INVESTIGATIONS IN OHIO FOR 1898 — Continued.

Date of Planting.	Date of Harvesting.	Date of Sampling.	Date of Analysis.	Average Weight of Beets, ozs.	Sucrose in Beets, Per Cent.	Purity Coefficient.	Laboratory Number.
May 10	Nov. 1	Nov. 1	Nov. 7	16	11.4	77.9	1236
				30.2	10.3	74.6	
May 23	Oct. 3	Oct. 3	Oct. 5	11	13.1	82.1	345
" 23	" 31	" 31	Nov. 2	9	12.5	77.6	1010
" 10	Nov. 1	Nov. 1	" 3	20	11.0	76.8	1042
				13.3	12.2	78.8	
May 10	Oct. 11	Oct. 11	Oct. 13	25	10.8	77.0	455
" 5	" 17	" 18	" 21	28	9.6	74.8	630
" 5	" 17	" 18	" 21	29	10.6	76.7	631
" 5	Nov. 4	Nov. 4	Nov. 7	14	9.4	76.8	1195
" 10	" 5	" 7	" 9	19	11.9	69.9	1300
" 10	" 7	" 7	" 11	67	8.5	68.0	1380
" 10	" 7	" 8	" 11	44	10.8	77.0	1388
" 15	" 14	" 14	" 14	28	9.1	72.7	1428
" 15	" 15	" 17	" 19	36	9.4	66.4	1562
" 8	" 17	" 17	" 21	25	12.1	76.5	1580
" 10	Oct. 25	Dec. 6	Dec. 9	10	14.4	78.3	1694
" 25	" 27	" 25	" 28	47	13.8	80.1	2163
" 25	" 31	" 25	" 28	57	10.4	71.7	2164
				33	10.8	74.3	
April 21	Sept. 19	Sept. 19	Sept. 26	15	13.0	83.5	208
" 23	Oct. 20	Oct. 20	Oct. 22	25	10.6	79.9	681
May 2	Nov. 3	Nov. 3	Nov. 5	36	10.5	73.3	1153
April 21	Sept. 19	Sept. 19	Sept. 24	18	12.6	76.5	2014
" 23	Oct. 1	Oct. 1	Oct. 1	21	12.1	80.9	2046
" 23	" 10	" 10	" 14	27	12.5	82.5	2067
" 23	" 20	" 20	" 22	34	11.3	82.6	2081
May 25	" 23	" 25	" 29	13	12.2	81.0	2092
" 25	" 23	" 25	" 29	44	10.9	77.7	2093
April 23	" 31	" 31	Nov. 2	24	12.2	84.2	2107
" 23	Nov. 15	Nov. 15	" 19	18	14.3	88.8	2153
" 23	" 17	" 17	" 19	18	14.9	87.2	2154
				24.4	12.3	81.5	
May 20	Oct. 14	Oct. 14	Oct. 17	17	10.5	75.3	541
" 20	" 22	" 22	" 26	30	10.8	77.6	785
.....	.....	.....	" 14	16	11.1	83.0	2072
				21	10.8	78.6	
May 15	Oct. 13	Oct. 13	Oct. 13	26	12.0	75.9	469
" 27	Nov. 8	Nov. 8	Nov. 10	38	10.3	73.0	1347
" 27	" 8	" 8	" 10	14	11.5	73.4	1352
				26	11.3	74.1	
April 30	Sept. 22	Sept. 22	Sept. 24	8	10.5	74.3	167
May 25	" 25	" 25	" 28	15	12.5	79.9	223
				11.5	11.5	77.1	
April 20	Sept. 22	Sept. 22	Sept. 26	17	9.5	72.5	178
" 20	" 22	" 23	" 26	13	8.6	72.8	189
May 10	Sept. 30	" 30	Oct. 1	16	7.6	68.4	284
" 10	Nov. 11	Nov. 11	Nov. 14	23	11.9	73.2	1462
				17.2	9.4	73.0	
" 15	Oct. 4	Oct. 4	Oct. 7	23.0	8.1	71.5	375
April 15	Oct. 3	Oct. 3	Oct. 5	32	11.6	83.0	341
May 3	" 3	" 3	" 5	24	10.6	77.2	342
" 28	" 24	" 24	" 26	32	9.8	75.9	764
" 15	" 27	" 27	" 29	44	9.8	73.1	870
" 27	" 28	" 28	" 29	52	10.6	75.0	892

TABLE II—DETAILED RESULTS OF SUGAR BEET

Laboratory Number.	Name of Grower.	Postoffice.	County.	Character of Soil.	Variety.
898	John Nohs	Rocky Ridge.	Ottawa	Black, loamy.	Klein Wanz.
962	Ferd. Greening	"	"	Black	
979	C. H. Fedderson	Limestone	"	Black loam	"
992	W. Holbert	Rocky Ridge	"	"	"
995	Chas. Drager	Oak Harbor	"	Mixed	
1002	Henry Schubert	"	"		
1016	A. Kline	"	"	Black soil	
1017	W. Ryder	"	"	Black	
1018	Chas. Rauch	"	"	"	
1021	Peter Hinrichs	Port Clinton	"	"	"
1024	Fred Kardotztte	Rocky Ridge	"	Black, not rich	
1041	Ludwig Wolf	Oak Harbor	"	Black loam	"
1044	John Hasenkamp	Trowbridge	"	Clay	"
1045	Mrs. John Gulan	Danbury	"	Black	
1068	J. W. Sodders	Locust Point	"	"	"
1069	W. Brokate	Oak Harbor	"	Clay	"
1070	Fred Alberts	"	"	Black loam	"
1082	N. H. Turen	"	"	Black loam	"
1084	Gottleib Dehring	Limestone	"	Clay	"
1085	Fred Klug	Oak Harbor	"	Black	"
1092	J. W. Stevens	Peachton	"	Black sand	"
1094	Frank Kahler	Oak Harbor.	"	Mixed clay	"
1150	John Kelly	Lakeside	"	Black loam	"
1152	Elliott Whipple	Oak Harbor	"	Black muck	
1156	F. H. Mylander	"	"	Sandy loam	"
1157	Louis Seelig	"	"	Blk. rich gr'd	Vilmorin.
1162	Harmon Belon	"	"	Black sand	"
1179	Chas. Wendt	"	"	Clay	"
1211	Gumb Bros	Limestone	"	Black loam	"
1219	John B. Kahler	Oak Harbor	"	Clay	Klein Wanz.
1258	August Kading	Trowbridge	"	Blue clay	"
1266	"	"	"	"	"
1289	Chas. Voehn	Oak Harbor	"	Black	"
1298	Herman Baumert	Rocky Ridge.	"	Black loam	"
1303	L. Cutcher	Oak Harbor	"	Black	"
1326	Wm. Schiller	Rocky Ridge	"	Black loam	"
1329	Albert Pfeiffer	Trowbridge	"		"
1340	Godfrey Base	"	"	Yellow clay	
1358	Albert Pfeiffer	"	"		"
1429	Albert Apling	Oak Harbor	"	Black prairie	
1458	Gottleib Dehring	"	"	Blk. heavy soil	"
1504	John H. Wohlers	Danbury	"	Black loam	
1508	Herman Baumert	Rocky Ridge.	"	"	"
1510	John Nissen	Port Clinton	"	"	"
1529	Gottleib Dehring	Limestone	"	Clay	"
1545	John Hasenkamp	Trowbridge	"	"	"
1573	Geo. Henl	Oak Harbor	"	Clay and black	
1587	Wm. Holbleib	Rocky Ridge	"		
1644	Godfrey Base	Trowbridge	"	Yellow clay	
1663	Sam Velliquette	Rocky Ridge.	"		"
1666	John Wolhers	Danbury	"	Blk. sandy l'm	
1667	"	"	"	Black loam	"
1708	Jacob Balduf	Lacarne	"	Clay and black	"
1711	S. C. Woodring	"	"	Blk. clay, low	
	Average, 59 samples.				
131	J. W. Kunkleman	Paulding	Paulding	Blk. clay loam	"
991	"	"	"	"	Vilmorin.
990	"	"	"	"	"
	Average, 3 samples.				
448	Mrs. Benj. Alspach	Thornville	Perry	Gravelly	"
449	"	"	"	"	Klein Wanz.
	Average, 2 samples.				
238	J. H. Dunlap	Williamsport	Pickaway	Black loam	"
1074	M. C. Sweet	Nelson	Portage	Sandy loam	"
1505	Ralph W. Curtice	Freedom Sta.	"	"	"
1509	"	"	"	"	Vilmorin.

INVESTIGATIONS IN OHIO FOR 1898—Continued.

Date of Planting.	Date of Harvesting.	Date of Sampling.	Date of Analysis.	Average Weight of Beets, ozs.	Sucrose in Beets, Per Cent.	Purity Coefficient.	Laboratory Number.
May 4	Oct. 28	Oct. 29	Oct. 31	34	11.9	81.7	898
" 20	" 28	" 29	" 31	34	9.5	71.9	962
" 10	" 31	" 31	Nov. 1	31	11.7	76.7	979
" 10	" 31	" 31	" 1	23	11.2	78.7	992
" 6	" 31	" 31	" 2	33	10.9	75.2	995
" 14	" 31	" 31	" 2	40	10.7	76.4	1002
" 14	" 30	Nov. 1	" 3	46	10.3	74.0	1016
" 30	Nov. 1	" 1	" 3	36	12.5	76.3	1017
" 10	Oct. 12	Oct. 29	" 30	26	12.6	76.0	1018
" 2	Oct. 31	Nov. 1	" 3	31	11.9	77.7	1021
" 1	Sept. 15	Oct. 31	" 3	26	12.4	76.5	1024
" 5	Oct. 29	Nov. 1	" 3	32	12.2	76.2	1041
" 10	" 30	Oct. 30	" 4	45	9.7	71.3	1044
" 5	Nov. 2	Nov. 2	" 4	18	9.5	69.0	1045
June 4	" 2	" 2	" 4	19	12.5	77.1	1068
May 16	" 2	" 2	" 4	25	12.5	78.0	1069
" 23	" 1	" 1	" 4	13	10.5	79.7	1070
April 29	Nov. 1	" 1	" 5	24	12.9	82.9	1082
May 5	" 3	" 3	" 5	32	12.0	81.3	1084
" 10	" 3	" 3	" 5	28	9.7	69.4	1085
June 6	" 2	" 3	" 5	17	9.8	74.1	1092
May 7	" 2	" 2	" 5	28	12.7	81.7	1094
" 15	" 2	" 3	" 5	55	7.9	67.0	1150
" 10	" 3	" 3	" 5	32	11.4	74.1	1152
" 12	" 4	" 4	" 5	28	12.5	79.9	1156
" 25	" 3	" 3	" 5	16	10.6	71.2	1157
" 10	" 5	" 5	" 7	31	11.0	80.0	1162
" 10	" 1	" 4	" 7	30	12.5	80.5	1179
" 4	" 4	" 4	" 7	43	12.3	84.3	1211
" 4	" 1	" 4	" 7	44	11.6	79.2	1219
" 7	" 5	" 4	" 7	38	10.3	73.0	1258
" 7	" 5	" 5	" 8	45	14.3	81.5	1266
" 19	" 3	" 5	" 8	29	9.6	71.9	1289
" 6	" 7	" 7	" 9	26	10.8	76.0	1298
" 3	" 7	" 7	" 9	38	9.9	72.7	1303
" 10	" 7	" 7	" 9	14	14.4	77.9	1326
" 4	" 8	" 8	" 10	38	12.3	80.6	1329
" 7	" 7	" 7	" 10	11	13.7	75.8	1340
" 4	" 8	" 8	" 10	31	12.1	80.4	1358
" 4	" 10	" 10	" 14	46	9.8	73.1	1429
" 5	" 12	" 12	" 14	12	11.6	79.2	1458
" 20	" 14	" 15	" 16	21	13.7	86.2	1504
" 16	" 14	" 14	" 16	31	11.5	76.6	1508
" 28	" 14	" 14	" 16	22	12.5	81.0	1510
" 5	" 15	" 15	" 17	36	10.4	74.2	1529
" 10	" 15	" 16	" 18	28	11.9	76.3	1545
June 25	" 16	" 16	" 19	14	11.9	77.2	1573
.....	Nov. 18	.....	" 21	23	11.0	76.8	1587
May 7	" 21	Nov. 21	" 21	10	14.3	80.2	1644
" 15	" 18	" 18	" 25	21	11.8	75.6	1663
" 20	" 22	" 23	" 25	16	10.5	76.9	1666
" 25	" 22	" 23	" 25	22	10.7	73.4	1667
" 28	" 1	.....	Dec. 15	23	12.2	83.1	1708
" 21	" 2	Dec. 8	" 15	11	13.5	81.1	1711
				28.8	11.5	77.0	
May 2	Sept. 21	Sept. 21	Sept. 23	26	12.2	76.6	131
" 2	Oct. 31	Oct. 31	Nov. 2	14	11.4	78.4	991
June 15	" 31	" 31	" 2	18	11.5	78.1	990
				19.3	11.7	77.7	
April	Oct. 10	Oct. 11	Oct. 13	25	12.6	84.2	448
"	" 10	" 11	" 13	20	10.1	76.3	449
				22.5	11.3	80.2	
May 10	Sept. 27	Sept. 27	Sept. 29	16	8.3	75.0	238
May 3	Nov. 3	Nov. 3	Nov. 5	12	10.5	80.3	1074
" 22	" 14	" 14	" 16	10	14.4	86.8	1505
" 22	" 14	" 14	" 16	6	12.6	.....	1509

TABLE II—DETAILED RESULTS OF SUGAR BEET

Laboratory Number.	Name of Grower.	Postoffice.	County.	Character of Soil.	Variety.
1513	L. M. Waite..... Average, 4 samples.	Windham	Portage.....	Sand and clay	Vilmorin.
373	C. C. Fudge.....	Eaton	Preble.....	Loam	Klein Wanz.
2143	W. H. Lough, Sr. ..... Average, 2 samples.	Richmond, Ind.....	"	Gravelly clay..	"
876	Alonzo Pitcher ..,.....	Dupont	Putnam.....	Heavy soil....	
896	Chas. Strite	Kieferville.....	"	Clay	"
897	"	"	"	"	"
2091	E. W. Dimock..... Average, 4 samples.	Dupont	"	Dark sandy loam	"
2136*	A. Hitchman	Butler.....	Richland...	.....	Reddish.
2137	"	"	" ...	.....	White.
901	F. J. Whittemore.....	Clyde	Sandusky...	Sandy loam...	Klein Wanz.
923	Jos. W. Vine.....	Vickery	" ...	Clay loam.....	"
946	Simon Kidman	Clyde..... ..	" ...	Black sand....	"
1008	Henry N. Prentice....	Teemes	" ...	Black clay....	"
1011	M. Prentice	"	" ...	Sand and clay	"
1149	J. H. Ickes.....	Burgoon	" ...	Black, sandy loam	"
1170	G. E. Wise.....	"	" ...	Black loam...	"
1369	A. M. Smith.....	"	" ...	Sandy loam...	"
1401	Don Martin	Teemes	" ...	Black loam...	"
1402	Harvey Smith	"	" ...	Black sand...	Vilmorin.
1486	David Daub	Burgoon	" ...	Sandy loam...	"
1499	"	"	" ...	" ...	"
1655	S. G. Kidman.....	Clyde.	" ...	Black ground.	Klein Wanz.
1689	A. M. Smith..... Average, 14 samples.	Burgoon	" ...	Sandy loam...	Vilmorin.
934	Thos. B. Hartley.....	Fostoria	Seneca.....	Black loam...	Klein Wanz.
1023	Fred Willey	Kansas.....	"	Blk. loam clay	Vilmorin.
1166	H. A. Betts.....	Bettsville	"	Black, loamy.	
1169	H. K. Beatty.....	"	"	Sand and clay	Klein Wanz.
1514	Jos. Deponet	Kansas	"	Black loam...	
1544	Fred Willey	"	"	Blk. loam clay	Vilmorin.
1585	J. H. Loose.....	Tiffin	"	Sandy limest'e	Klein Wanz.
1589	"	"	"	"	Vilmorin.
2084	Jno. Hollinbaugh	Kansas.....	"	Black	Klein Wanz.
2121	Thos. B. Hartley.....	Fostoria	"	Clay	
2158	J. H. Loose.....	Tiffin.....	"	.....	Vilmorin.
2159	"	"	"	.....	Klein Wanz.
2160	J. R. Drown.....	Watson	"	.....	"
2161	" ..... Average, 14 samples.	"	"	.....	"
1661	C. R. Wells	Sidney	Shelby.....	Rich clay.....	Vilmorin.
1662	" ..... Average, 2 samples.	"	"	"	Klein Wanz.
2139	L. G. Kelley.....	Alliance.....	Stark.....	Sandy loam...	"
2140	" ..... Average, 2 samples.	"	"	Sandy	"
182	R. J. Dallinga.....	Akron..... ..	Summit.....	Sandy loam...	"
192	Aaron Teeple	"	"	" ...	"
193	"	"	"	" ...	Vilmorin.
623	C. O. Hale.....	Ira	"	Rich blk. clay loam	Klein Wanz.
624	"	"	"	Blk. clay loam	"
634	E. F. Cranz.....	"	"	"	"
893	J. T. Reimer.....	Loyal Oak..... ...	"	Sandy loam...	"
1368	Julius Frank	Akron.....	"	Clay loam.....	"

*Not included in averages.

INVESTIGATIONS IN OHIO FOR 1898—Continued.

Date of Planting.	Date of Harvesting.	Date of Sampling.	Date of Analysis.	Average Weight of Beets, ozs.	Sucrose in Beets, Per Cent.	Purity Coefficient.	Laboratory Number.
May 22	Nov. 14	Nov. 14	Nov. 17	35	11.4	77.4	1513
				15.7	12.2	81.5	
May 20	Oct. 5	Oct. 5	Oct. 7	26	9.0	73.6	373
May 3	Nov. 10	Nov. 11	Nov. 15	21	12.3	82.7	2143
				23.5	10.6	78.1	
May 16	Oct. 24	Oct. 25	Oct. 29	50	11.7	79.9	876
April 26	" 27	" 27	" 31	11	10.0	78.3	896
" 26	" 27	" 27	" 31	26	9.6	75.4	897
" 30	" 27	" 27	" 29	47	11.0	81.1	2091
				33.5	10.6	78.7	
.....	.....	.....	Nov. 12	38	4.6	58.3	*2136
.....	.....	.....	" 12	31	9.1	72.2	2137
				31.	9.1	72.2	
May 15	Oct. 27	Oct. 28	Oct. 31	31	10.0	77.7	901
" 9	" 28	" 28	" 31	26	11.8	78.0	923
" 5	" 29	" 29	" 31	33	10.0	77.8	946
" 18	" 31	" 31	Nov. 2	.....	.....	.....	1008
" 27	" 31	" 31	" 2	16	12.5	80.9	1011
June 10	Nov. 3	Nov. 3	Nov. 5	33	6.9	64.0	1149
May 20	" 4	" 4	" 7	34	9.8	74.7	1170
" 18	" 3	" 8	" 11	37	10.1	76.3	1369
" 20	" 1	" 4	" 12	14	11.8	72.1	1401
" 18	" 10	" 10	" 12	52	7.9	66.0	1402
" 27	" 14	" 14	" 16	48	9.2	79.5	1486
" 27	" 14	" 14	" 16	27	7.6	71.4	1499
" 1	" 22	" 22	" 25	21	13.1	87.3	1655
" 18	" 13	" 30	Dec. 6	41	9.2	75.2	1689
				31.8	10.0	75.5	
May 12	Oct. 27–28	Oct. 29	Oct. 31	22	11.2	78.7	934
June 23	Nov. 1	Nov. 1	Nov. 3	36	12.0	80.0	1023
May 24	" 5	" 5	" 7	28	9.5	76.9	1166
" 25	" 4	" 4	" 7	35	9.5	76.9	1169
" 25	" 14	" 15	" 17	52	8.7	73.0	1514
" 27	" 1	" 16	" 18	36	12.0	76.8	1544
" 10	" 17	" 18	" 21	29	8.6	69.8	1585
" 10	" 17	" 18	" 21	28	8.6	71.4	1589
June Oct. 20		Oct. 20	Oct. 24	18	12.4	84.4	2084
May 1	" 28	" 28	Nov. 4	19	13.4	82.4	2121
.....	.....	.....	" 25	31	8.4	83.8	2158
.....	.....	.....	" 25	35	11.0	81.7	2159
.....	.....	.....	" 25	54	12.3	80.1	2160
.....	.....	.....	" 25	56	8.7	67.6	2161
				34.2	10.4	77.4	
June 10	Nov. 22	Nov. 22	Nov. 25	26	10.6	75.7	1661
" 10	" 22	" 22	" 25	22	11.8	80.5	1662
				24.0	11.2	78.1	
May 15	Nov. 11	Nov. 11	Nov. 15	17	12.6	80.6	2139
" 15	" 11	" 11	" 15	13	13.4	79.6	2140
				15.0	13.0	80.1	
April 8	Sept. 24	Sept. 24	Sept. 26	15	11.9	81.8	182
May 10	" 24	" 24	" 26	8	10.5	78.6	192
" 10	" 24	" 24	" 26	6	12.8	85.5	193
" 30	Oct. 18	Oct. 18	Oct. 20	24	10.4	76.3	623
April 27	" 18	" 18	" 20	43	8.6	70.6	624
May 28	" 19	" 19	" 21	11	11.1	80.2	634
" 23	" 27	" 27	" 29	30	10.5	74.3	893
June 6	Nov. 9	Nov. 9	Nov. 10	26	9.3	74.2	1368

TABLE II—DETAILED RESULTS OF SUGAR BEET

Laboratoay Number.	Name of Grower.	Postoffice.	County.	Character of Soil.	Variety.
2130	C. O. Hale.....	Ira	Summit.....	.....	Klein Wanz.
2131	"	"	"	.....	"
	Average, 10 samples.				
2123	F. M. Rhutz.....	Zoar	Tuscarawas.	.....	Vilmorin.
2124	"	"	"	.....	Klein Wanz.
2125	"	"	"	.....	"
	Average, 3 samples.				
1669	C. E. Jackson.....	Peoria	Union.....	Sandy loam...	Vilmorin.
1226	C. H. Hymen.....	Van Wert	Van Wert..	Black loam....	"
1591	C. E. Chambers.....	"	" ..	"	Klein Wanz.
1658	J. W. Jenkins.....	Cavett	" ..	Dark	"
1659	"	"	" ..	"	Vilmorin.
2050	F. P. Stump.....	Convoy	" ..	Clay loam.....	Klein Wanz.
2051	"	"	" ..	"	Vilmorin.
2069	"	"	" ..	"	"
2070	"	"	" ..	"	Klein Wanz.
	Average, 8 samples.				
282	Amos Ritter	Cedar Valley.....	Wayne.....	Sandy loam...	"
313	Mrs. Ben Zimmerman.	Smithville	"	Clay & gravel	"
377	G. W. Werntz.....	Doylestown.....	"	Clay loam.....	"
394	Robert Eason	Springville	"	.....	Vilmorin.
447	Jordan Bros. & Co...	Creston	"	Sandy loam...	Klein Wanz.
719	G. W. Werntz.....	Doylestown.....	"	Clay loam.....	"
777	Austin Brandt	Smithville.....	"	Yellow clay...	"
1006	I. W. Knestrick.....	Creston	"	Sandy soil.....	"
1115	Austin Brandt	Smithville.....	"	Yellow clay...	"
1151	W. H. Wright.....	Rittman	"	Loam	Vilmorin.
1698	Mrs. B. Zimmerman..	Smithville	"	Gravelly clay.	Klein Wanz.
2008	Jordan Bros. & Co....	Creston	"	Black sand....	"
2009	" "	"	"	Mucky, black.	Vilmorin.
2023	" "	"	"	Loam	"
2024	" "	"	"	"	Klein Wanz.
2036	" "	"	"	Black loam...	Vilmorin.
2037	" "	"	"	Loam	Klein Wanz.
2065	" "	"	"	Sandy loam...	"
2066	" "	"	"	" ...	Vilmorin.
2087	Godfrey Myferth	Koch	"	Sandy	
2083	"	"	"	" loam...	Klein Wanz.
2089	Robert Eason	Springville	"	Loam	Vilmorin.
2098	I. W. Knestrick.....	Creston	"	Sandy soil....	Klein Wanz.
2108	Jordan Bros. & Co....	"	"	Black sand....	"
2109	" "	"	"	Clay	Vilmorin.
2112	Daniel Harter	Smithville	"	Sandy	Klein Wanz.
2113	"	"	"	.....	Vilmorin.
2114	"	"	"	.....	"
2115	Austin Brandt	"	"	Clay	Klein Wanz.
2122	G. W. Werntz.....	Doylestown	"	Clay loam.....	"
2132	W. H. Wright.....	Rittman	"	Loam	Vilmorin.
2148	Jordan Bros. & Co....	Creston	"	Black sand....	"
2149	" "	"	"	....	Klein Wanz.
2165	I. W. Knestrick.....	"	"	Sandy loam...	"
2166	"	"	"	Black loam....	Vilmorin.
	Average, 35 samples.				
950	C. E. Orton.....	West Unity.....	Williams...	Black loam....	Klein Wanz.
1188	A. H. Hagemeister....	Lime City.	Wood.....	Black muck...	Vilmorin.
1189	"	"	"	" ...	Klein Wanz.
2094	A. R. Morgan.....	Maumee	"	.....	"
2095	"	"	"	Black loam....	Vilmorin.
	Average, 4 samples.				

INVESTIGATIONS IN OHIO FOR 1898—Concluded.

Date of Planting.	Date of Harvesting.	Date of Sampling	Date of Analysis.	Average Weight of Beets, ozs.	Sucrose in Beets, Per Cent.	Purity Coefficient.	Laboratory Number.
.....	Nov. 3	Nov. 3	Nov. 5	87	8.9	77.0	2130
.....	" 3	" 3	" 5	56	8.7	74.8	2131
				30.6	10.3	77.3	
June 7	.....	.....	Nov. 4	29	10.5	75.0	2123
" 7	.....	.....	" 4	19	10.7	75.3	2124
" 7	.....	.....	" 4	25	10.5	73.3	2125
				24.3	10.6	74.5	
April 23	Nov. 23	Nov. 25	Nov. 28	7	10.2	74.3	1669
May 10	Nov. 4	Nov. 4	Nov. 7	48	10.5	73.8	1226
" 10	" 19	" 19	" 21	20	11.0	77.3	1591
" 23	" 22	" 22	" 25	23	12.7	79.8	1658
" 23	" 22	" 22	" 25	23	12.1	77.9	1659
" 26	Oct. 2	Oct. 2	Oct. 5	19	12.7	82.2	2050
" 26	Oct. 2	" 2	" 5	18	12.3	80.1	2051
" 26	" 11	" 11	" 14	12	10.1	74.1	2069
" 26	" 11	" 11	" 14	19	9.7	76.1	2070
				22.8	11.4	77.7	
May 12	Sept. 29	Sept. 29	Oct. 1	17	11.1	78.0	282
" 11	" 30	" 30	" 3	13	10.5	77.5	313
" 26	Oct. 5	Oct. 6	" 7	16	10.6	79.3	377
April 16	" 10	" 5	" 8	18	6.2	58.0	394
May 26	" 20	" 10	" 18	18	13.7	86.2	447
" 26	" 20	" 21	" 24	15	11.9	81.7	719
June 8	" 22	" 24	" 26	12	12.8	82.3	777
May 2	" 31	" 31	Nov. 2	16	10.5	78.0	1006
June 8	Nov. 2	Nov. 2	Nov. 5	13	10.6	74.5	1115
May 20	" 1	" 3	" 5	17	9.5	71.4	1151
" 20	Dec. 1	Dec. 7	Dec. 9	14	10.2	71.8	1698
April 16	Sept. 12	Sept. 12	Sept. 15	21	12.6	84.2	2008
" 16	" 12	" 12	" 15	22	12.1	81.9	2009
" 16	" 22	" 22	" 24	18	12.0	78.3	2023
" 16	" 22	" 22	" 24	20	14.2	87.6	2024
" 16	Oct. 1	Oct. 1	Oct. 4	23	14.7	93.3	2036
" 16	" 1	" 1	" 4	23	13.3	91.5	2037
" 16	" 10	" 10	" 14	23	12.9	85.1	2065
" 16	" 10	" 10	" 14	23	14.1	90.2	2066
" 25	" 25	" 25	" 29	15	14.1	84.6	2087
" 25	" 25	" 25	" 29	54	11.4	78.4	2088
May 20	" 28	" 28	" 29	9	4.9	61.1	2089
" 2	" 31	" 31	Nov. 2	18	10.5	82.1	2098
April 16	Nov. 1	Nov. 1	" 2	20	13.2	87.4	2108
" 16	" 1	" 1	" 2	20	11.1	85.4	2109
.....	" 2	" 2	" 2	11	13.9	88.9	2112
.....	" 2	" 2	" 2	13	12.7	87.6	2113
.....	" 2	" 2	" 2	35	11.9	84.0	2114
June 8	Oct. 29	Oct. 29	" 2	9	14.4	84.9	2115
May 26	" 31	" 31	" 4	13	14.0	84.0	2122
" 20	Nov. 1	Nov. 1	" 5	17	9.3	76.6	2132
April 16	" 14	" 14	" 17	20	12.5	88.6	2148
" 16	" 14	" 14	" 17	18	14.0	89.1	2149
May 2	" 25	" 28	Dec. 3	17	13.3	85.4	2165
" 2	" 25	" 28	" 3	17	14.1	89.7	2166
				18.6	11.8	81.7	
May 15	Oct. 28	Oct. 29	Oct. 31	48	12.4	81.8	950
May 20	Nov. 4	Nov. 4	Nov. 7	48	10.0	75.6	1188
" 20	" 4	" 4	" 7	28	13.3	80.9	1189
" 15	Oct. 29	Oct. 29	Nov. 2	28	13.3	83.8	2094
" 15	" 29	" 29	" 2	28	13.8	84.8	2095
				33.0	12.6	81.3	

TABLE III—SUMMARY OF TABLE II.

County.	Number of Samples.	Average Weight of Beets, ozs.	Sugar (Sucrose) in Beets, Per Cent.	Purity Coefficient.
Ashland	2	12.0	12.5	81.1
Ashtabula	11	16.7	12.2	79.7
Auglaize	2	25.0	10.6	77.9
Brown	2	19.5	10.4	80.1
Champaign	22	17.4	10.5	76.9
Clarke	29	18.8	12.2	77.9
Clermont	8	18.6	11.3	77.7
Clinton	1	37.0	7.4	65.0
Columbiana	2	19.0	13.2	80.4
Coshocton	3	22.7	10.0	76.3
Crawford	7	28.4	11.4	78.6
Darke	4	15.5	9.7	75.8
Defiance	2	14.5	12.0	81.4
Delaware	3	19.3	11.1	78.8
Erie	26	22.0	12.0	80.5
Fairfield	2	12.5	12.2	78.8
Fayette	2	46.0	10.3	75.9
Franklin	10	21.0	11.2	76.5
Fulton	25	22.4	13.1	83.0
Geauga	2	27.0	11.3	79.0
Greene	12	20.0	9.7	74.2
Guernsey	2	20.0	11.3	77.7
Hancock	12	20.4	10.9	78.7
Hardin	5	29.4	11.9	78.9
Henry	15	26.7	11.5	79.6
Highland	13	8.9	11.7	78.6
Holmes	2	15.5	7.7	73.5
Knox	16	17.2	11.0	78.6
Lake	5	12.2	13.1	82.4
Logan	6	16.0	10.9	77.6
Lorain	2	19.5	9.5	71.4
Lucas	17	32.4	12.7	81.7
Madison	3	20.3	9.9	75.3
Mahoning	1	14.0	10.8	78.6
Marion	5	30.2	10.3	74.6
Medina	3	13.3	12.2	78.8
Mercer	13	33.0	10.8	74.3
Miami	12	24.4	12.3	81.5
Montgomery	3	21.0	10.8	78.6
Morgan	3	26.0	11.3	74.1
Morrow	2	11.0	11.5	77.1
Muskingum	4	17.2	9.4	73.0
Noble	1	23.0	8.1	71.5
Ottawa	59	28.8	11.5	77.0
Paulding	3	19.3	11.7	77.7
Perry	2	22.5	11.3	80.2
Pickaway	1	16.0	8.3	75.0
Portage	4	15.7	12.2	81.5
Preble	2	23.5	10.6	78.1
Putnam	4	33.5	10.6	78.7
Richland	1	31.0	9.1	72.2
Sandusky	14	31.8	10.0	75.5
Seneca	14	34.2	10.4	77.4
Shelby	2	24.0	11.2	78.1
Stark	2	15.0	13.0	80.1
Summit	10	30.6	10.3	77.3
Tuscarawas	3	24.3	10.6	74.5
Union	1	7.0	10.2	74.3
Van Wert	8	22.8	11.4	77.7
Wayne	35	18.6	11.8	81.7
Williams	1	48.0	12.4	81.8
Wood	4	33.0	12.6	81.3
Southern section	51	18.4	10.9	76.9
Middle "	153	19.6	11.1	76.9
Northern "	294	25.0	11.6	78.7
Entire State	498	22.7	11.4	77.9

TABLE IV—COMPARISON OF GENERAL RESULTS FOR 1897 AND 1898.

Section.	Number of Samples.		Average Weight, Beets, Ounces.		Sugar in Beet, Per Cent.		Purity Coefficient.	
	1897	1898	1897	1898	1897	1898	1897	1898
Southern section	67	51	31.4	18.4	12.2	10.9	75.3	76.9
Middle "	132	153	32.6	19.6	13.2	11.1	78.0	76.9
Northern "	355	294	29.2	25.0	13.6	11.6	79.4	78.7
Whole State	554	498	30.6	22.7	13.3	11.4	78.7	77.9

RESULTS OF ANALYSIS IN 1898.

From Table IV it will be seen that while there has been an improvement in the culture of sugar beets by the various growers, well indicated by the diminished average weight of sample beets from 30.6 to 22.7 ounces, the sugar content and purity have on the average failed to show improvement. The average percent of sucrose (sugar) in the beet is about 2 percent lower in all portions of the state in 1898 than in 1897, despite the improvements in methods of growing, though the purity coefficient falls, on the average, only 0.8 percent below that of last year. It may be that methods of culture have had effect here, even under the diverse weather conditions of 1898 as compared with 1897. It has seemed, from the general complaint of insect ravages, and the yet more generally observed presence of the beet leaf spot fungus, *Cercospora beticola* Sacc., wherever the writer visited the sugar beet plots, that these must be taken into account in any reckoning we may choose to make concerning the causes of lower sugar content of the beets for 1898.

The superiority of the northern portion, for sugar production, will appear from the tabulation of results by sections, as already given in Table III. Good beets have been grown in most portions of the state by individuals; yet, as will be seen from a careful study of the results, the averages are very much in favor of that region of Ohio in which the most favorable theoretical conditions prevail. In all sections the beets were mature quite early — many of them by September 15. See Table V.

TABLE V.—ANALYSES OF SUGAR BEETS SAMPLED AT DIFFERENT DATES.

KLEINWANZLEBENER ELITE (DIPPE).

Dates of Sampling.	Grown by S. J. Mann, Lindenville, Ashtab'la Co.		Grown by John Mullaney, Sandusky, Erie Co.		Grown by G. W. Powell, Findlay, Hancock Co.		Grown by F. S. Wolcott, Delta, Fulton Co.		Grown by Charles Lang, Colton, Henry Co.	
	Per cent. Sucrose in beets.	Purity coefficient.	Per cent. Sucrose in beets.	Purity coefficient.	Per cent. Sucrose in beets.	Purity coefficient.	Per cent. Sucrose in beets.	Purity coefficient.	Per cent. Sucrose in beets.	Purity coefficient.
September 12	11.9	76.6					13.3	83.3		
September 21-23	14.1	79.6	13.5	83.5	12.	79.7	13.2	81.8	9.6	72.8
October 1-3	9.7	74.5	12.	82.4			12.5	82.		
October 10-14	14.2	85.6					14.3	86.2	11.6	85.9
October 20-25	11.8	78.5			11.2	80.8				
October 31-November 2					11.2	83.7	13.	83.		
November 8-17			14.2	83.7			14.3	86.7		

VILMORIN'S IMPROVED.

September 12	11.9	80.6					13.8	81.9		
September 21-23					12.5	83.5	12.5	75.9	12.1	82.9
October 1-3	11.3	88.8					13.4	85.5		
October 10-14							13.5	84.	8.4	67.2
October 20-25					11.8	81.6				
October 31-November 2					12.7	84.9	12.6	84.2		
November 8-17							14.9	89.2		

TABLE V.—Concluded.

KLEINWANZLEBENER ELITE (DIPPE).

Dates of Sampling.	Grown by Jordan Bros. & Co., Creston, Wayne Co.		Grown by Ben Ames, Mt. Vernon, Knox Co.		Grown by R. L. Holman, Springfield, Clarke Co.		Grown by W. W. Crane, Tippecanoe City, Miami Co.		Grown by I. A McCoy, Lodore, Highland Co.	
	Per cent. Sucrose in beets.	Purity coefficient.	Per cent. Sucrose in beets.	Purity coefficient.	Per cent. Sucrose in beets.	Purity coefficient.	Per cent. Sucrose in beets.	Purity coefficient.	Per cent. Sucrose in beets.	Purity coefficient.
September 12	12.6	84.2			15.3	81.3			12.6	76.4
September 21-23	14.2	87.6	12.4	81.6	14.2	81.9			11.3	63.7
October 1-3	13.3	91.5	12.2	80.	13.4	86.	12.1	80.9	13.4	87.
October 10-14	12.9	85.1	11.3	80.4	14.3	81.5			11.7	79.3
October 20-25			*13.4 9.2	84.4 70.3					12.4	82.3
October 31-November 2	13.2	87.4	9.6	77.7	12.8	82.3	12.2	84.2	12.2	79.
November 8-17	14.	89.1			**14.	89.1	12.8	79.	12.8	81.3

VILMORIN'S IMPROVED.

September 12	12.1	81.9			15.4	82.2			11.4	78.9
September 21-23	12.	78.8	11.3	79.3	15.2	80.8	***12.6	76.5	12.2	83.7
October 1-3	14.7	93.3	12.4	84.	13.7	85.7			9.2	74.6
October 10-14	14.1	90.2	10.7	82.5	13.5	84.	12.5	82.5	11.9	82.3
October 20-25			12.5	84.6			11.3	82.6	10.7	75.8
October 31-November 2	11.1	85.4	9.5	74.6	11.1	78.5			10.6	77.2
November 8-17	12.5	88.6			12.5	88.	14.9	87.2		

*Sampled October 17. **Stored in cellar till December 3. ***Sampled September 19.

TABLE VI.—SHOWING TABULATION OF CULTURAL

No.	Name.	County.	Township.	Exposure — slope.	Soil characters.		
					Surface soil.	Sub-soil.	Original growth.
1	W. J. Read	Ashland	Jackson		Black loam		
2	S. J. Mann	Ashtabula	Wayne	N	Clay		Map. & bch.
3	John Ray	"	Williamsf'd	E	Sandy loam		Oak, chest.
4	H. H. Schoville.	"	Rome.	W	Clay loam	Hard pan	Beech & ma.
5	Jos. Gehrlich	Auglaize	Washingt'n	S	Bl., sand. loam	Yellow	Elm, ash
6	E. J. M. Kintner	Carroll	Butler	S.W.	Loam	Clay	
7	Wm. Hanna	Champaign	Madison	S	Clay loam		Beech & elm
8	S. O. Cheetham.	"		N	Sandy clay	Red clay	
9	G. W. Notestine	"	Adams	N	Blk. clay soil.		Ash,elm,oak
10	Wm. Rapp	"	Mad River	N.E.	Clay	Yellow clay	Beech
11	Alby Kite	"	Johnson	S	Clay loam	Limestone	Wal., sugar.
12	L. C. Clem	"	"		Sandy loam		Cherry, ash.
13	James T. Kite	"	"	S.E.	Sand and clay	Red clay	
14	J. J. McIntire	"	Concord		Black clay		
15	S. J. Barger	"			Clay loam	Black	
16	L. E. Pence	"		N	"		Beech & ash
17	Wm. Patrick	"					
18	C. T. Coates	Clarke	Harmony	L	Black loam	Clay	Oak & wal.
18	" "	"	"		"	"	" "
19	R. L. Holman	"	Moorfield	W	Clay		B.wal. & oak
19	" "	"	"				
20	Wm. Collier	"	Mad River	L	Clay	Black	Oak
21	T. C. Vearil	Clermont	Sterling	N.E.	Clay loam	Yellow	Oak & map.
22	Frank Judd	"	Batavia	S.E.	"	Hard pan	
23	Fred Hussey	Clinton			"		
24	F. M. Boring	Columbiana	Fox	N	Mellow clay	Dark	Oak
25	J. P. Darling	Coshocton	Jefferson	L	Sandy loam	"	
26	G. W. Darling	"	"		Clay		Wal. & elm.
27	Wm. F. Smith	Crawford	Cranberry	L	Black loam	Blue clay	Elm & map.
28	P. A. Spaid	"	Liberty	L	Black soil	Hard pan	Sugar & bch
29	J. Krauter, Jr.	"	Bucyrus	L	Black loam		
30	J. H. Cook	"	Whetstone	L	Sandy clay	Blue	Map. & elm
31	Jonas Dininger	Darke	Greenville	S.E.	Sandy loam	Black	Oak
32	W. J. Wagner	"	Neave	S.W.	Clay loam	Red clay	Bch. & sug.
33	M. Ankerman	Rand'lph,Ind.	Jackson	W	Clay		
34	L. F. Blanchard	Defiance	Highland	S	Clay soil	Bluish clay	B.oak & elm
35	Henry Greenler	"			Black sand		
36	J. B. Crow.	Delaware	Delaware	L	Clay		Elm & bch.
37	John Fitz	Erie		L	Black clay		Unknown
38	Ferd. Ortner	"	Margaretta	L	Black loam	Clay	White ash.
39	A. G. Brownell	"	Milan		Sandy soil		Apple
40	H. A. Miller	Fairfield	Sixteen	S.W.	Clay loam		Map. & wal.
41	F. P. Miller.	"	Rush Creek	S.E.	Sandy	Clay	Ap. & cher.
42	L. P. Roemer	Fayette	Union	L	Bl., sand. loam	Hard pan	Oak
43	Sam'l Taylor	Franklin	Jackson		Black soil	Clay	Map. & elm
44	Nich. Wilhelm.	"			Black loam		
45	J. W. Wolpert	"	Norwich	S	Red clay		Hick. & oak
46	F. S. Wolcott	Fulton	York	S.W.	Sandy clay	Yellow	Oak & pop.
47	" "	"	"	L	Sandy soil	Black	Black ash
48	T. H. Fraker	"	"	L	Heavy clay		Mostly elm.
49	E. H. Patterson.	"	Dover	W	Sandy		
50	S. McCullough	"	Fulton	L	Black sand	Hard pan.	Cottonwood
51	B. F. Todd	"	Suancricz	N	Sandy soil	Black	
52	F. A. Raker	"	Swan Creek		Loose, yel. sd.		
53	Miss L. E. Doup	Geauga	Claridon	L	Sand loam		Maple, elder
54	J. D. Miller	Greene	Spring Val.	S.W.	Sd., clay loam	Gravel	Maple
55	A. B. Garringer.	"	Silver Cre'k	W	Sand to clay	Sand	Wal., w. ash
56	E. N. Jacobs	"	Beaver Cr'k	S	Sand loam		
57	O. M. Conner	"	Silver Cre'k	L	Black loam		
58	J. C. Andrew	"	Xenia	S	Clay loam		
59	Jos. Schoenherr	"	Bath		Black loam		
60	G. W. Powell	Hancock	Liberty	N.W.	Clay loam	Clay	Ma., elm, ash
61	Harry Powell	"	"		Black loam	"	B. ash, etc
62	Michael Long	Hardin	Jackson	N	Clay loam	Hard pan	Wal., etc.
63	" "	"	"		Sandy cr. bot.		Wal. & oak,
64	N. S. Martin	"	Cessna	W	Clay	Yellow clay	Beech, hick.
65	J. W. Bowers	Henry	Richfield	L	Clay loam	Clay	Elm
66	S. Wagoner	"	Swan Creek	L	Black loam	"	Willow, ald.
67	E. L. Emery	"	Damascus	L	Yellow sand	Black sand	Elm, ash, m.
68	R. J. Shoemaker	"	Bartlow	L	Black loam		
69	J. W. Robinson.	"	Richfield	L	Bl., sand. loam	Clay	C'wood, elm
70	I. A. McCoy	Highland	Marshall	S	Clay loam		Cherry, wal.

DATA REPORTED BY GROWERS.

Cash values.		Crop on land in 1897.	Manuring in '97 or '98.	Plowing.			Preparation of soil.			No.
Land, per acre.	Rent, per acre.			Date.	Depth.	Labor.	Labor.	Implements used.	Implements for planting.	
					In.	*Hrs.*	*Hrs.*			
$50	$2 50	Corn	None	Apr. 30	5	½		Sp. har. & p. dr.		1
35		"	S.M.'97, C.F.'98	June 1	8	5		O. har. & c. cru.	P. hand drill	2
40	2 00	"	B. M	Apr. 10	8	1½	1	Har. & p. drag		3
25	2 00	Turnips	"	May 4	10					4
60	3 00	Wheat	None	" 8	8	1½	1½	Har. & drag	By hand	5
30	1 50	Buckwheat	"	Apr. 28	12	5	1½	" "	Garden drill	6
40	3 00	Sweet corn	S. M. '97	" 12	9	5	5	Har. & roll	Wheat drill	7
100		Clov. & tim.	None	" —	6	2	4			8
80	3 00	Clover	"	" 20	9	3	2			9
25	50	"	None		6	10	5	Smoothing har.	Grain drill	10
60	4 00	Potatoes	"	Apr. 20	7	1½	1½	Har. & drag	Seed drill	11
12	3 00	Corn		May 1	10	5	10	" "	" "	12
50	4 00	Pot. & cab.	S. M. '97	Apr. 1	10	½	½	" "		13
		Pastured	S. M					" "		14
		Onions	None	Apr. 28						15
50	4 00	Clover	"	Mar. 15	8	5		Har. & p. drag		16
										17
40		Nothing	B. M	Apr. 28	6	7½		Har. & rolled		18
40		"	"	" 28	6					18
75	5 00	Clover	None	" 15	16	15	3	Har. & drag		19
75	5 00	"	"	" 15	16			" "		19
45	4 00	Tim. hay	Manured '97	" 10	15	2	3	" "		20
30	2 00	Potatoes	S. M	" 7	8	3	5	" "		21
30	3 00	Pasture		" 3-7	12	9	6		By hand	22
			Manured		12					23
25	2 00	Potatoes	S. M. in W.	May 2	12	1	3	S. t. har. & p. dr.	By hand	24
100		Wheat	None	" 9	10	5		Harrowed		25
35	2 00	Clover	B. M. in W	Apr. 12	8	2	3	Har. & rolled		26
		Clov. & tim.	Manured '97							27
85	4 00	Corn	None	Apr. 15	8	2	2	Disk har.	Hand drill	28
65	3 50	"	"	" 5-6	8	3	4	Har. & rolled		29
60		Potatoes	"	May 25	12	5	20			30
80		Beets	S. M. in W.	" 10	12	2	1½	Har. & drag		31
50	3 00	Blue grass	None	" 2	10	4	14	Smoothing har.		32
40	3 00	Clover	"	" 6	8			Har. & drag	By hand	33
40	4 00	Alsike clov.	"	Apr. 2	12	1¼	1¼	Harrow	P. hand drill	34
		Cabbage	"	" 10						35
75	4 00	Corn	Manured 1	May 16	7	3	5		Garden drill	36
80	7 00	Potatoes	None	Apr. 1	9	3	5	Disk har	Sup. g. drill	37
75	5 00	"	Manured '98	" 3	7	3½	2¼	Drag. & rolled	P. hand drill	38
100	10 00	Clover	Manured	" 1	14	5	3	Dragged		39
60	5 00	Timothy		" 10	8	½	¼	Disk & s. har.	By hand	40
50	2 50	Wheat	Manured '98	May 23	15	4	2½	Disk har. & dr.	Drilled	41
120	6 00	Pot. & corn	S. M	" 11	12	15	12	Cultivat. & har.	Garden drill	42
60	4 00	Clover	None	Ap. 6-7	8	12	6	Harrow	Hand drill	43
										44
		Pasture	S. M. '98	Apr. 5	7	⅓	⅙	Acme har	By hand	45
50	4 00	Potatoes	S. M. '96-'97	May 4	7	10	4	D. har. & weed	P. hand drill	46
50	5 00	Strawber	S. M. '94-'95	" 4		4	2	" "	" "	47
65	4 00	Oats	Manured '96	Mar. 31	8	10	6	D. har. & drag	Garden drill	48
40	5 00	Clover	None		8	3	3	Har. & rolled	By hand	49
40	3 00	Potatoes	S. M	Apr. 1	11	5	2½	Har. & float	" "	50
50	3 00	Oats	S. M. in W.		6	1	12	Harrow		51
25	1 25	Pas., Jun. gr.	S. M. '98	Apr. 5	11	7	6	Har. & cultivat		52
25	3 00	Potatoes	Com. fertil.	May 7	8	1	1	Har. & clod cru.	Hand drill	53
65	8 00	Corn	None	" 3	10	1	1	Harrow	By hand	54
60	3 50	Timothy	"	Apr. 1	2	1	1	Har. & planked	" "	55
75		Truck	Manure '98						Hand drill	56
75	5 00	Potatoes	None	Apr. 12	10	2	2	Har., disk har.	" "	57
50	5 00	Clover	Manure '98	May 10	12	10	10	Har., roll., disk		58
75	8 00	Wheat	None		6	5	5			59
50	3 50	Corn	"	Apr 15	10			Har. & planked	Hand drill	60
75	4 00	Sweet corn	"	May 4	8	4	2	" "	" "	61
50	5 00	Pasture	Manure '97	Apr. 15	8	1	½	Har. & disk	By hand	62
50	5 00	Clover	None	May 2	8	1	½	Disk & har.	" "	63
50	4 00	"	"	Apr. 5	8	10	5	Har., roll., plnk.	Grain drill	64
60	4 00	Oats	"	May 3	12	5	3	Disk & roller	" "	65
	5 00	Corn	"	" 1	9	1	1	Drag & roller	By hand	66
		"		" 6		½	¼	Harrow	" "	67
50		"	Manure '97	Nov. 1		10	10	Har. & plank		68
60	4 00	"	Clover	Apr. 23	12	5	2	Har. & rolled		69
30	3 00	Rye & peas	R. & p. '97, r. '98	" 22	15	5	7	Roller & har.	Drill	70

TABLE VI—SHOWING TABULATION OF CULTURAL

Number.	Name.	Planting.			Thinning.			Cultivation.	
		Date.	Labor.	Distance of rows.	Date.	Labor.	Distance bet. beets.	Before beets came up.	Number times after—total hours labor.
			Hr.	*In.*		*Hr.*	*In.*		
1	W. J. Read	May 23	1	16	July 10	....	6	None	H
2	S. J. Mann	June 2	5	20				C.with we'dr	C. 5; H. —: 10?
3	John Ray	May 20	2	24	July 12–14	30		Harrowed	C. 3; H. 3: 15?
4	H. H. Schoville	May 13	1	28	June 13	5	4		C. 3; H. 1: 4
5	Joseph Gehrlich	May 14	1½	22	Jnly 20	3	5		C. 2; H. 1: 7
6	E. J. M. Kintner	May 10	½	20				None	
7	Wm. Hanna	April 25	2		June 25	10	10	Harrowed	C. 5. H. —: 70
8	S. O. Cheetham	May 10	3			30		None	C. —; H. —: 15
9	G. W. Notestine	May 10	6		June 9	2	4		C. 2; H. —: 24
10	Wm. Rapp	April 27	2½	20				Harrowed	C. —; H. —: 56½
11	Alby Kite	April 20	1	20	May 18	10	3	None	C. —; H. —: 32
12	L. E. Clem	May 10	5	20	June 10–15	50	4–6	None	C. 3; H. —: 100
13	James T. Kite	April 16	2	27					C. 15; H. —: 50
14	J. J. McIntire			20				None	C. —; H. —
15	S. J. Barger	May 31		22					C. ; H. —
16	L. E. Pence	April 28	3	18					C. 2; H. 1: 17
17	Wm. Patrick								
18	C. T. Coates	May 14	10	18		24		Harrowed	C. 2; H. 2
18	C. T. Coates	May 14		18				Harrowed	C. 2; H. 2
19	R. L. Holman	May 20	3	15	June 14	16	6	None	C. 4; H. } 65
19	R. L. Holman	May 20		15	June 14			None	C. 4; H. }
20	Wm. Collier	May 17	1	24	July 10–15	25	6	Harrowed	C. 4; H. —: 20
20	Wm. Collier	May 1		24	July 10–15		6	Harrowed	C. 4; H. —
21	T. C. Vearil	May 19–20	12½	18	June 9		7		C. 1; H. 3: 24
22	Frank Judd	April 28	16	24	June 1	12	4–6		C. 3; H. 3
23	Fred. Hussey	May 2		24	June 5				C. 4; H. 2
24	F. M. Boring	May 18	3		June 3	10	6		C. 2; H. —: 14
25	J. P. Darling	May 19	6	22	July 10,11,12		6	None	C. 3; H. 2: 50
25	J. P. Darling	May 19	6	22					
26	G. W. Darling	April 22	4	24		18	6		C. 5; H. —: 208
27	Wm. F. Smith	May 14		10			10	None	C. 3; H. 2
28	P. A. Spaid	May 10	2	30	June 10	20	6–10	None	C. 3; H. —
29	J. Krauter, Jr	May 10	5	24	June 1	27	6	Weeder	C. 2; H. —: 9
30	J. H. Cook	May —	10	18			3–4	None	C. 1; H. 1
31	Jonas Dininger	May 11	9	24	June 6	4	6	None	C. 4; H. 1: 15
32	W. J. Wagner	May 16	8	22	June 21	12	6	S. T. Harrow	C. 3; H. —: 25?
33	M. Ankerman						8		
34	L. F. Blanchard	April 11	2	16	May 17	12	4	None	C. —; H. 4: 8
35	Henry Greenler	May 25–27		20			6		C. 1; H. 5
36	J. B. Crow	June 4	5	22		15		Harrowed	C. —; H. 3: 30
37	John Fitz	May 5	1½	21	June 21	20	6–8	None	C. 2; H. —: 13
38	Ferd. Ortner	May 7	7	18	June 6–7		6–8		C. 2; H. —; 3
39	A. G. Brownell	April 11	5	22	May 24–26	90	4		C. 2; H. 3; 41
39	A. G. Brownell	April 11		22	May 24–26		4		C. 2; H. 3
40	Henry A. Miller	May 15	¾	28		½	3–6		C. 3; H. 4: 2
41	Frank P. Miller	June 4	7					With weeder	C. —; H. —
42	L. P. Roemer	May 30	4½	18	June 11–17	40	6–7	Harrowed	C. 3; H. —: 85
43	Samuel Taylor	May 1	6	20		40	6		C. 3; H. —: 70
44	N. Wilhelm	May 9		24	June 10	10	7		C. —; H. —: 10
45	J. W. Wolpert	May 13–28	⅔	24	June 25		7	None	C. —; H; —: 3
46	F. S. Wolcott	May 11	6	24	June 11–17	50	8	Raked	C. 1; H. 3: 37½
47	F. S. Wolcott	May 11	3	24	June 11	6⅔	7	None	C. 4; H. —: 30
48	Thos. H. Fraker	April 28		24	June 2–6	70			C. —; H. —: 34
49	E. H. Patterson	May 2–3	22	24			6	None	C. 2; H. 1: 30
50	S. McCullough	April 8	5	30	June 10–25	40	6		C. 6; H. —; 70
51	B. F. Todd	May 3	10	20					C. 4; H. —
52	F. A. Raker	April 15	5	20				Harrowed	
53	Miss L. E. Doup	May 10	3	28	June 14	20	7	None	C. 3; H. —: 3
54	J. D. Mills	May 4	2	26	June 10		8	None	C. 2; H. —: 8
55	A. B. Garringer	May 19	1½		June 19	6	10	Hand rake	C. —; H. 5: 10
56	E. N. Jacobs	June 20		20			4–10	None	
57	O. M. Conner	May 10	2	18		5	6	None	C. 3; H. 3: 36
58	J. C. Andrew	May 13	6	24	June 15		6	None	C. 12; H. —: 14
59	Jos. Schoenherr		15	30		15	8	None	C. 3; H. —: 10
60	G. W. Powell	May 4	4	28	July 15			None	
61	Harry Powell	May 17	2				4–6	None	C. 2; H. —; 20
62	Michael Long	May 5	2	24	July 2	1	6	None	C. —; H. 3: 9
63	Michael Long	May 19	1½	18	July 2	½	6	None	C. —; H. 3: 6
64	N. S. Martin	April 30	1½	24			12	Breeds w'd'r	
65	John W. Bowers	May 13	1½	21	June 13		6–8	None	C. 4; H. —:
66	Simon Wagoner	May 10	4	22	June 10–15	20	3	Harrowed	C. 4; H. —: 12
67	E. L. Emery	May 14–18		18	June 10–15	27	5–6	None	C. —; H. —
68	R. J. Shoemaker	May 5	30	24		40	6	Raked	C. 2; H. —: 20
69	J. W. Robinson	May 6	2	21	June 10	30	6–8	Rolled	C. 4; H. 2: 28
70	I. A. McCoy	April 30	2	20	June 14	6		None	C. —; H. 4: 20

C. 5,= five times with horse or wheeled cultivator; H. 3,= three times with hoe.

DATA REPORTED BY GROWERS—Continued.

Harvesting.		Actual area in beets. Square rods.	Yields—actual.		Calculated yields per acre.		Variety.	No.
Date.	Labor hours.		Beets and tops, pounds.	Topped beets, pounds.	Beets, tons.	*Sugar, pounds.		
.....	10	.....	.....	.....	.....	.....	Klein Wanz.....	1
.....	.....	80.	.....	Little.	.....	.....	Vilmorin & Klein Wanz	2
Nov. 15–18	50	49.40	9,200.	5,900.	9.5	1,929.	" " "	3
" 14	2	4.75	.....	.....	19.(?)	.....	Klein Wanz.....	4
October 19	14	40.	.....	4,070.	8.1	1,553.	Vilmorin & Klein Wanz	5
.....	.....	40.	.....	.....	.....	.....	" " "	6
November 2	30	48.48	.....	8,250.	13.16	2,933.	" " "	7
.....	.....	59.2	.....	9,800.	10.5	2,293.	" " "	8
November 3–4	28	40.4	.....	7,500.	15.0	2,862.	Klein Wanz.....	9
" 2	15	82.0	.....	.....	.....	.....	.....	10
" 8–9	15	60.	8,980.	6,435.	8.6	1,683.	Vilmorin & Klein Wanz	11
October	.....	90.	.....	.....	(26 ?)	.....	" " "	12
November 2	40	40.	.....	5,000.	10.	1,962.	" " "	13
.....	.....	.....	.....	.....	.....	.....	.....	14
October 27	.....	.....	.....	.....	7.62	.....	Klein Wanz.....	15
November 14	10	40.	.....	.....	12.5	2,767.	Vilmorin & Klein Wanz	16
.....	.....	.....	.....	.....	.....	.....	.....	17
November 15	.....	42.4	.....	.....	13.	2,163.	Vilmorin Impd	18
" 15	.....	42.4	.....	.....	19.6	4,057.	Klein Wanz Elite.....	18
" 8–12	65	40.0	.....	.....	15.0	3,780.	Vilmorin Improved.....	19
" 8–12	.....	40.0	.....	.....	15.0	3,780.	Klein Wanz Elite.....	19
.....	20	44.0	.....	.....	16.5	3,237.	" "	20
.....	.....	.....	.....	.....	.....	.....	.....	20
.....	.....	20.1	6,340.	4,936.	18.8	3,593.	Vilmorin & Klein Wanz	21
.....	.....	80.	.....	.....	4.5	.....	Klein Wanz.....	22
November 15	.....	.....	.....	.....	.....	.....	"	23
.....	10	8.81	1,665.	1,215.	11.0	2,620.	"	24
October 28	45	160.	37,170.	30,210.	15.1	.....	Vilmorin & Klein Wanz	25
.....	.....	.....	32,482.	24,424.	12.2	.....	Vilmorin	25
" 29	45	80.	.....	11,000.	11.0	1,960.	Vilmorin & Klein Wanz	26
November 8	.....	96.41	.....	.....	.....	.....	Klein Wanz...	27
" 3	20	33.	.....	3,000.	7.3	1,545.	Vilmorin & Klein Wanz	28
October 28	20	80.	.....	17,000.	17.0	3,366.	" " "	29
.....	20	80.	.....	21,780.	21.8	4,756.	" " "	30
November 16	11	20.	.....	4,935.	19.6	3,446.	Klein Wanz	31
October 23	10	80.	18,077.	12,479.	12.5	2,178.	Vilmorin & Klein Wanz	32
.....	.....	.....	.....	.....	.....	.....	" " "	33
November 10	6	19.4	.....	5,700.	23.3(?)	.....	" " "	34
Nov. 24–5–6	....	80.	.....	18,000.	18.0	.....	" " "	35
.....	20	20.	.....	1,000.	4.	797.	" " "	36
Nov. 11–14	15	80.	43,200.	34,560.	17.3	3,456.	" " "	37
.....	7½	80.	45,238.(?)	27,350.(?)	27.9(?)	[12.4%]	" " "	38
.....	50	90.0	.....	.....	.....	.....	" " "	39
.....	.....	.....	.....	.....	.....	.....	.....	39
November 18	1	2.0	322.	242.	13.2	2,941.	Klein Wanz.....	40
" 22	.....	13.0	.....	.....	.....	.....	Vilmorin.....	41
" 22–25	25	40.11	16,320.	11,020.	21.9	.....	Vilmorin & Klein Wanz	42
" 1–4	40	105.80	48,460.	35,392.	26.8(?)	5,348.	" " "	43
October 4	.....	4.4	.....	875.	15.9	2,863.	Klein Wanz...	44
Oct. 31. Nov. 21	15	17.0	.....	.....	.....	.....	"	45
November 1–2	60	110.5	.....	.....	15.4	3,649.	Klein Wanz & Vilmorin	46
" 3	30	31.5	.....	.....	21.4	4,942.	" " "	47
Oct. 27. Nov. 2	60	80.0	18,508.	15,455.	15.5	3,727.	" " "	48
" 29–31	40	80.	.....	8,230.	8.2	1,837.	Vilmorin & Klein Wanz	49
" 20	.....	55.	.....	.....	.....	.....	" " "	50
" 20	.....	24.	.....	.....	.....	.....	" " "	51
.....	.....	82.	.....	.....	.....	.....	" " "	52
.....	.....	16.5	1,032.	774.	3.9	787.	Vilmorin Improved... .	53
October 15	.....	8.5	2,400.	1,600.	15.0	2,172.	" "	54
November 14	10	8.	.....	1,778.	17.8	2,364.	Vilmorin & Klein Wanz	55
.....	.....	41.8	.....	5,345.	10.2	1,838.	Klein Wanz.	56
November 5	10	18.4	.....	2,160.	9.4	1,600.	"	57
.....	20	41.2	8,000.	6,000.	11.6	2,101.	Vilmorin & Klein Wanz	58
.....	15	.....	.....	.....	.....	.....	" " "	59
Nov. 18–20	.....	106.	.....	.....	low	.....	" " "	60
.....	20	.....	.....	.....	.....	.....	" " "	61
November 18	5	13.2	5,296.	3,564.	21.6	4,281.?	Klein Wanz	62
" 18	4	7.0	2,808.	1,602.	19.5	3,864.?	"	63
.....	....	1.50	456.	320.	16.4	3,736.	Vilmorin & Klein Wanz	64
Nov. 16–18	75	100.	300.	240.	12.(?)	.....	" " "	65
" 15	30	40.	.....	8,000.	11.0	2,576.	" " "	66
October 29	10	16.	5,816.(?)	5,074.(?)	12.5(?)	[13.1%]	" " "	67
November 5–6	20	114.6	24,750.	13,500.	9.4	2,001.	Vilmorin & Klein Wanz	68
....	65	80.	.....	.....	7.5	1,788.	" " "	69
.....	.....	40.	.....	500.	1.0	.....	" " "	70

*The sugar yield is computed upon composition of beets after deducting 10 per cent tare.

TABLE VI.—SHOWING TABULATION OF CULTURAL

No.	Name.	County.	Township.	Exposure—slope.	Soil characters.		
					Surface soil.	Sub-soil.	Original growth.
71	G. B. Painter	Holmes	Salt Creek	L	Dark loam		
72	Frank Miller	"		W	Sandy loam		Wild plum.
73	A. Blue	Knox			"		
74	J. Harry Keller	"	Liberty	E	Clay		Beech, wal.
75	John Tawney	Lake	Madison	L	Sandy		Chest., elm.
76	W. S. Colby	Lake	Madison	N	Sand, gravel		Maple, oak.
77	A. Whipple	"	"	W	Clay loam		Beech, map.
78	L. H. Pool	Logan	Miami	E	Bl., sand. loam	Yellow clay	Beech, sug.
79	C. E. Fox	Lorain		E	Clay loam		
80	C. R. Bowen	Lucas		L	Bl., sand. loam	Sand.	Poplar
81	C. D. Kuntz	"	Oregon	W	Sandy	Yellow clay	Oak, maple.
82	Y. Rakestraw	"	Waterville	L	B. and y. sand	Clay	Oak
83	D. G. Chandler	"	Sylvania	L	Clay loam		Beech, map.
84	A. R. Morgan	"					
85	G. C. Betts	"	Providence	S	Sandy loam		
86	Michael Smith	"	Sylvania	L	Black loam	Clay	Elm, ash, oak
87	G. W. Bamsey	"	"		Mixed loam		
88	John Neeper	"	Swanton	S	Sandy		Alder, pop.
89	I. H. Warner	Madison	Gerome	L		Limestone	Ash, oak, bch.
90	L. M. Johnson	Mahoning	Milton	N	Clay loam	Yellow clay	
91	J. S. Martin	"		N.E.	Deep loam		Ash
92	Sam'l Bolander	Marion	Pleasant	S	Sandy		Elm, ash
93	E. E. Coulter	"	Scott	Roll.	S. and b. loam		Cherry, oak.
94	J. B. Crain	Clarke	Three	L	Clay loam	Gravel	Sug., b. wal.
95	Adam Leister	Medina	Medina	W	Sandy loam		B. wal., cher.
96	G. M. Brainerd	"	"	S	Clay loam		Beech, map.
97	John Haubert	Mercer	Butler	L	Loam		Oak, beech.
98	H. Dillinghaus	"	Franklin		New grd., blk.		
99	Jos. Osterfeld	"	Granville		Yellow clay		Bir., elm, etc.
100	J. B. Garrison	"	Jefferson	S. E.			
101	Wm. W. Crane	Miami			Loam		
102	J. W. Harris	"			Clay loam		
103	I. J. Merritt	"	Brown				Ash, oak, etc.
104	H. C. Murphy	Morgan	Marion	S	Bl., sand. loam		Walnut
105	C. H. Turner	Morrow	Lincoln	E	Sandy	Rocky	Oak, elm
106	W. H. Ramey	"	Gilead	W			Orchard
107	W. Hoover	Muskingum	Newton	L	Sandy		
108	The Clark Co.	Ottawa	Allen		Loam		
109	John W. Peltay	Noble	Center	N	Bl., sand. loam		Poplar, bch.
110	C. L. Reid	Paulding	Paulding		Black loam		
111	J.W.Kunkleman	"	Jackson	L	Black	Clay	Elm, ash, oak
112	Mrs. B. Alspach	Perry		E	Gravel		
113	D. H. Coleman	"	Madison	N.E.	Clay		
114	J. D. Stutman	Portage			Sandy loam		
115	M. C. Sweet	"	Nelson	S.E.	Clay and sand		Elm, beech.
116	Ralph Curtiss	"	Charlest'n	E	Clay loam		
117	W. H. Lough	Preble			Gravel, clay		Truck patch
118	E. W. Dimock	Putnam	Perry	S.W.	Yellow sand	Blue clay	E., oak, haz.
119	Charles Strite	"			Clay		Elm
120	A. Pitcher	"	Perry	L	Heavy gray		Oak, elm, ash
121	J. H. Loose	Seneca	Pleasant		Sandy		Apple, peach
122	T. B. Hartley	"	London	L	Loam	Clay & gravel	
123	C. R. Wells	Shelby	Clinton	L	Yellow clay	Hard pan	
124	Aaron Teeple	Summit	Portage	E	Sandy loam	Gravel	
125	C. O. Hale	"	Bath	L	Bl. clay loam	Clay	Walnut, oak
126	E. F. Cranz	"	"	W	Sandy loam		O., map., elm
127	Lewis C. Cranz	"	"	S. E.	Loam		Wal., maple
128	R. J. Dallinga	"			Sandy loam		
129	Mrs. L. G. Kelly	Stark			"	Hard pan	
130	E. C. Jackson	Union	Liberty	E	Loam		Beech, oak.
131	N. E. Dunifon	Van Wert	York		Black loam		
132	F. P. Stump	"	Tully	L	Clay loam		Oak, hickory
133	C. H. Hymen	"	Hoaglin		Loam		
134	E. E. Chambers	"	Ridge	L	"	Hard pan	Oak, elm
135	J. W. Jenkins	"	Union	L	Dark, sandy	Blue clay	" "
136	R. Eason	Wayne			Clay		
137	A.H.Hagem'ster	Wood	Perrysburg		Black muck		Oak, hickory
138	G. W. Werntz	Wayne	Chippewa		Clay loam	B. & yel. clay	Oak, ash
139	D. H. Harter	"			Sandy		Chest., oak.
140	JordanBro.& Co.	"	Canaan	S.W.	Sandy loam	Sand and clay	Alder, elm
140	" " "	"	"	S.W.	"	" "	" "
141	I. W. Knestrick	"	"	L	"		Elm, beech.
142	Austin Brandt	"	Greene	S	Yellow clay		
143	O. A. E. Sta., by J. F. Hickman	"	Wooster	N	Clay loam	Clay	Chest., oak.

DATA REPORTED BY GROWERS—Continued.

Cash values.		Crop on land in 1897.	Manuring in '97 or '98.	Plowing.			Preparation of soil.			No.
Land, per acre.	Rent, per acre.			Date.	Depth.	Labor.	Labor.	Implements used.	Implements for planting.	
					In.	*Hrs.*	*Hrs.*			
$100	$8 00	Beets	Manure '96	May 1	20	½	½	Harrow		71
50	4 00	Clov. & tim.	None	Apr. 25	8				By hand	72
50		None	"		9				"	73
50	3 00	Clover	"	Apr. 20	9		5	Dragged	Drilled	74
75	5 00	Wheat	Manure	May 5	12	2½		Harrowed	Hand drill	75
100	10 00	Raspb. & po.	Manure '98	Apr. 27	10	2½	2	"	" "	76
50	2 00	Corn fol. rye	Bon. '97, salt '98	" 8	7	1¼	1½	"	Drilled	77
60	4 00	Clover	None	" 18	12	3	3	Har. & disk	By hand	78
40	3 00	Garden	Manure '97	" 15	8					79
	4 00	Cabbage	" '97	May 15	8					80
150	5 00	Clover	" '97	Apr. 11	8	10	10	Harrow	Hand drill	81
75	5 00	Clo. h. & seed	None	Oct. '97	8	6	6		" "	82
60	50	Clover	"	Apr. 27	8	2½		Har. & roller	By hand	83
								Drag		84
75	4 00	Raspber	Manure	Apr. 15	8	5	8		By hand	85
50	4 00	Corn	Manure '97	" 20	8	7	18	Har. & disk	Hand drill	86
60	3 50	Mangelwur	None	" 13	12	5	2½	Har. & roller	" "	87
25	2 00	Rye	Manure '97	" 15	24					88
50	5 00	Potatoes	" '97	Jan. —	10	6		Cultivat. & har.	Hand drill	89
		S. corn & po.	None		7	2		Har. & rake	" "	90
50	2 00	Potatoes	"	Apr. 10	9			Harrow		91
60	5 00	Tim. & clov.	"	Mar.—	8	2	1	"		92
	3 50	Corn	Manure '97	May 1	15					93
80	5 00	Timothy	Manure '97-8	Wint'r	7	6	8	Harrow	H. beet drill	94
	3 00	Potatoes	"	Apr. 20		1	1	"	By hand	95
30	2 25	Tim. & clov.	B. M. '97	May 13	8	4		"	" "	96
50	3 00	Clover	Manure '98	Apr. 26	12	5	7	Har. & roller		97
			None	Jan. —		5	5		By hand	98
40	2 50	Tim. & clov.	"	Oct. 15	7	½	2	Har. & roller		99
55	4 00	C'n, po., cab.	Manure '98	Jun. 15						100
			Clover	Nov.—						101
		Potatoes	S. M		8					102
50		Clover	Clover			2		Harrow	By hand	103
50		Potatoes	S. M. '97	May 26	10	2	4	"		104
75	4 00	Beets	None	" 23	11					105
60		Potatoes	"	Apr. 29	8	1	2	Har. & roller	Hand drill	106
75	5 00	Clov. & tim.	"	May 5	15	4				107
75	3 00	Corn	"	Apr. 2	15	10	10	Har. & roller	By hand	108
50	10 00	Tobacco	"	May 15	10	4	1½			109
60	4 00	None	"		8	15	10	Rake & shovel	By hand	110
50	3-5	Corn	"	Apr. 1	10	10	7½	Harrow, roller	Wheat drill	111
75	3 00	Wheat	"	Apr. 15	10	5	5	Harrow, drag	By hand	112
20		Meadow	"		8	2	2			113
	2 00	Grass								114
40	5 00	Corn	Potato phos	Apr. 20	10	5	15	Har. & plank	Hand drill	115
40	2 00	Potatoes	Manure '98						" "	116
		Truck			13					117
50	3 00	Potatoes	Manure '97-'98	Apr. 27	10	2	½	Planker	Drill	118
										119
					8					120
35		Potatoes	S. M. '97							121
80		Truck	Manure	Apr. 20	9	1	½	Har. & plank		122
60	3 50	Clover past.		May 5	10	5	5	Har., roll., plnk.	By hand	123
60	6 00	Corn	Manure '97-'98	Apr. 15	8	3	5	Har., disk, plnk.	Hand drill	124
1,500	10 00	Beets & cel.	" '98	" 25	10	1	1	Drag & plank	" "	125
75	2 00	Truck	" '97	Fall	8				" "	126
40	2 00	Corn	" '97	May 3	7		3	Har. & cultivat.	" "	127
50	2 50	Onions	" '97	Apr. 8	7	½	1½	Har., disk, roll.	" "	128
80		Potatoes		" 5	12	3	3		" "	129
50		Clover	Overflowing	May 25	6			Har. & roller	Grain drill	130
25	2 00	½ tim. ½ tr.	None	A. 15-20		5	2	Har. & drag	By hand	131
										132
40	5 00	Corn	None	Apr. 9	10					133
50	4 00	Truck	S. M. '97	May 1	6	1	1½	Har. & pulver		134
50	4 00	Corn & pot	" '97	Apr. 4	12	4	3	Har. & drag	Hand drill	135
50	4 00	W. clo., past.	None	Mar. 30	12	6		Harrow		136
			Manure '98							137
100	3 50	Corn	" '98	May 10	8½			Drag		138
30	3 00	Pop corn	None	" 25	6	1	1		By hand	139
60	5 00	Corn	Manure '97		11	2	3	Har., roll., boat	" "	140
125	10 00	Potatoes	Com. fert. '98	No. '97	8	2	5	" " "	Drill	140
125	10 00	"	" " '98	" '97	8	2	5	" " "	"	140
50	3 00	Truck	None	Apr. 25	8	3½	3¼	Disk & harrow		141
100	6 00	Corn	Com. fertil		8	½	½	Har., boat, roll	By hand	142
		Clov. & tim.	" " '97	Apr. 25	9-15			Har. & roller	S. beet drill	143

TABLE VI—SHOWING TABULATION OF CULTURAL

Number.	Name.	Planting.			Thinning.			Cultivation.	
		Date.	Labor.	Distance of rows.	Date.	Labor.	Distance bet. beets.	Before beets came up.	Number times after—total honrs labor.
			Hr.	*In.*		*Hr.*	*In.*		
71	G. B. Painter...	May 4	1/6	18	June 1	2	9	None	C. —; H. 6: 4.....
72	Franklin Miller	May 28	....	36	July 17	.....	.....	.....	C. 3; H. 3.....
73	A. Blue.....	May 10	....	20	June 15	....	4-6	None	.....
74	J. Harry Keller.	.....	....	24	.....	15	6	None	C. 4; H. —: 40...
75	John Tawney...	.....	2	20	.....	8	.....	None	C. —; H. 4: 8.....
76	W. S. Colby.....	April 29	3½	18	May 16-17	...	6	H. Cultiv'tor	C. 2; H. —: 70½..
77	A. Whipple.....	May 4	1½	16	June 8-9	15	6	Weeder	C. 2; H. 3: 25.....
78	L. H. Pool.....	May 18	7	30	.....	....	....	.....	....
79	C. E. Fox.....	May 12	....	.....	.....	.....	.....	None	....
80	C. R. Bowen.....	....	.....	.....	.....	...	....	None	.....
81	C. D. Kuntz.....	April 12	10	30	June 3	40	8	None	C. 5; H. —: 25...
82	Y. Rakestraw...	May 30	5	18	.....	.....	.....	None	C. —; H. —: 48...
83	D. G. Chandler..	April 27	4	30	.....	20	4-6	Weeder	C. 5; H. —: 20....
84	A. R. Morgan...	.....	.....	.....	.....	.....	.....	.....	.....
85	G. C. Betts.....	May 9	30	....	.....	....	11	... .	C. —; H. 2: 15....
86	Michael Smith..	May 10	15	20	.....	80	6	Weeder	— —; H. —: 100..
87	G. W. Bamsey...	April 20	2	24	June 22-26	30	6	Cultivated..	C. —; H. —: 12...
88	John Neeper ...	May 12	6	30	.....	30	4	Harrowed .	C. 3; H. —: 23....
89	I. H. Warner....	May 4	3	16	.....	....	3-6	None	C. —; H. —: 10...
90	L. M. Johnson..	May 9	1	18	.....	.....	.....	.....	.....
91	I. S. Martin. ...	May 11	1	22	July 14	3	5	.. ..	C. —; H. —: 8..
92	Sam'l Bolander.	May 10	1/3	20	June 10	10	8	Rolled	C. 5; H. —: 12....
93	E. E. Coulter...	....	1½	42	.....	40	4-6	....	C. 3; H. —..... .
94	J. B. Crain.	May 14	4	24	June 16	20	4-6	None	C. 2; H. —: 12....
95	Adam Leister...	May 10	2	.....	.....	...	6-10	Harrowed ..	C. 3; —. —: 5.....
96	G. M. Brainerd.	May 23	2	18	June 20	3	6	None	C. —; H. 4: 10...
97	John Haubert...	May 3-9	29	20	.....	.....	.....	None	C. —; H. —: 45. .
98	H. Dillinghaus	May 5	....	36	.....	5	6-8	.....	C. 2; H. —: 26.. .
99	Jos. Osterfeld...	May 10	1	36	June 30	....	12	None	C. 2; H. 2: 18.....
100	J. B. Garrison...	.....	....	.....	.....	.....	.....	None	.....
101	Wm. W. Crane..	April 22	....	20	June 1	....	....	.....	.....
102	J. W. Harris....	May 23	...	20	June 28	....	6	.....	.....
103	I. J. Merritt.....	.....	1/2	36	.....	5	8	Harrowed ..	C. 4; H. —: 5½...
104	H. C. Murphy...	May 27	3	24	June 22-25	10	6	....	C. 3; H. 3: 15.....
105	C. H. Turner...	May 24	3/4	20	.....	10	6-8	None	.....
106	W. H. Ramey...	April 30	1/2	.....	May 18	....	4	.....	C. 4; H. 4: 20.....
107	W. Hoover.....	May 20	5	24	.....	5	6-8	Weeder	C. —; H. 2: 10....
108	The Clark Co...	May 5	30	.....	June 6	40	6	None	C. 1; H. —: 30....
109	John W. Peltay.	May 20	2	24	.....	2	6	None	C. —; H. 4; 15...
110	C. L. Reid.....	.....	20	16	.....	.....	.....	None	— —; H. — .....
111	J.W.Kunkleman	May 2	2	24	.....	20	2-18	None	C. —; H. — 80 ..
112	Mrs. B. Alspach.	April 29	10	24	July 1-15	120	6	None	C. —; H. —: 5....
113	D. H. Coleman..	.....	....	.....	.....	....	.....	Raked	C. —; H. —. 7, ..
114	J. D. Stutman...	.....	.....	.....	.....	.....	.....	None	....
115	M. C. Sweet.....	April 28	4	20	June 15-21	60	... .	.....	C. 3; H. 1: 35 ....
116	Ralph Curtiss..	.....	.....	28	.....	....	6	.....	.....
117	W. H. Lough, Sr.	May 3	....	20	June 5	...	6	.....	C. 4; H. 1.....
118	E. W. Dimock..	April 30	....	24	May 20	....	12	None	C. 2; H. 2: 70.....
119	Charles Strite .	May 26	....	18	June 12	....	6	.....	C. 3; H. 3. .....
120	A. Pitcher.....	....	....	36	....	....	8	None	C. 3; H. 3 .....
121	J. H. Loose.....	May 10	10	.....	June 1	10	7	None	C. —; H. —: 40...
122	Thos. B. Hartley	May 12	5	24	May 28	10	6-8	None	C. 3; H. 3: 19.....
123	C. R. Wells.....	... .	10	26	July 10	10	12	None	C. —; H. —: 20...
124	Aaron Teeple...	May 10	1/2	16	.....	....	....	Raked	C. 4; H. —: 4.....
125	C. O. Hale	April 27	....	.....	.....	....	8-10	None	C. —; H. 3.....
126	E. F. Cranz. ...	May 28	1/3	24	June 23	4½	5	None	C. 3; H. —.....
127	Lewis C. Cranz..	May 4	1/2	24	....	....	.....	None	C. 2; H. —: 12⅔ .
128	R. J. Dallinga...	April 8	3½	... ..	May 23	....	.....	.....	.....
129	Mrs. L. G. Kelly	....	.....	24	July —	....	.....	None	.....
130	E. C. Jackson...	April 23	2	30	June 18	....	8	None	C. —; H. —: 9....
131	A. E. Dunifon ..	May 5	...	42	June 5	....	...	....	... .
132	F. P. Stump	May 26	...	24	.....	....	..	None	C. —; H. 1.....
133	C. H. Hymen....	May 10	3	24	June 1	....	6	None	C. 2; H. —: 30...
134	E. E. Chambers.	May 10	3	16	June 27-28	10	4-6	Raked	C. 3; H. —: 20....
135	J. W. Jenkins...	May 23	20	.....	....	...	.....	None	....
136	R. Eason.....	May 15	....	30	....	...	4-6	.....	.....
137	A.H.Hagemeis'r	May 2	15	24	June 25	20	6	Dragged....	C. 1; H. —: 25....
138	G. W. Werntz...	May 26	2/3	30	July 18	1½	6-10	None	C. 2; H. 1: 3.....
139	D. H. Harter....	May 10	...	.....	.....	20	4	Harrowed ..	C. 1; H. —: 15....
140	Jordan Bro.&Co.	April 16	{ 3	16	June 1	50	4-6	Weeder	C. 8; H. —: 60...
140	Jordan Bro.&Co.	April 16	{	.....	.....	.....	.....	.....	.....
141	I. W. Knestrick.	May 2	4	18	June 10-11	9½	3-4	Weeder	C. —; H. —: 25...
142	Austin Brandt..	June 8	1½	30	....	....	.....	.....	C. 4; H. —: 2.....
143	O. A. E. Sta., by J. F. Hickman.	May —	....	18-30	....	....	.....	None .	.....

DATA REPORTED BY GROWERS—Concluded.

Harvesting.		Actual area in beets. Square rods.	Yields—actual.		Calculated yields per acre.		Variety.	No.
Date.	Labor hours.		Beets and tops, pounds.	Topped beets, pounds.	Beets, tons.	*Sugar pounds.		
							Klein Wanz	71
							"	72
October 31		12.			5.0			
					8.0		Vilmorin Improved	73
November 11	10	40.		7,000.	14.0	3,024.	Vilmorin & Klein Wanz	74
" 7	16	80.					Vilmorin	75
" 17	32	79.8		6,875.	6.9	1,451.	Vilmorin & Klein Wanz	76
" 2-3	20	40.	12,160.	9,720.	19.4	3,539.	" " "	77
		80.					" " "	78
					32.0(?)		Vilmorin Improved	79
								80
November 2-18	110	118.6	41,940.	31,940.	21.5	5,171.	Vilmorin & Klein Wanz	81
" 22	80	160.0			7.25	1,412.	" " "	82
" 14-15	20	33.3	13,310.(?)	10,890.(?)	26.14(?)		" " "	83
								84
November 1-3		52.52			13.0	2,686.	Vilmorin & Klein Wanz	85
	50	180.0			12.0		" " "	86
	55	80.	20,102.	17,272.	17.3	3,730.	" " "	87
							" " "	88
		22.0					Klein Wanz	89
							Vilmorin & Klein Wanz	90
	5	11.70					Klein Wanz	91
November 15	10	5.6					"	92
		169.7		53,000.(?)	24.9(?)	3,953.	Vilmorin & Klein Wanz	93
	20	84.7		13,000.	12.2		" " "	94
		12.0					Klein Wanz	95
October 3		5.9	115.	70.	15.0	3,496.	"	96
		76.3			13.6	2,964.	"	97
					10.0	2,000.	"	98
	40						"	99
October 11	12	37.1	4,000.	3,400.	7.1	1,291.	"	100
							Vilmorin & Klein Wanz	101
							" " "	102
October 11		16.0					Klein Wanz	103
	20				20.9	3,800.	Vilmorin & Klein Wanz	104
November 22	10	17.3	4,888.	4,512.	16.5	3,701.	Klein Wanz	105
" 15		1.0	274.	204.			"	106
September 22	5	5.1					"	107
	10						"	108
	100	90.	22,600.	21,600.	19.2		"	109
	5	24.	950.	900.	3.	508.		
		40.					Vilmorin & Klein Wanz	110
		160.	53,578.8	54,667.	27.3(?)	5,616.	" " "	111
	90	80.	18,000.	17,700.	17.2	3,600.	" " "	112
	10	7.						113
							Klein Wanz	114
		80.					Vilmorin & Klein Wanz	115
							" " "	116
November 10		72.		8,000.	8.9	1,968.	Klein Wanz	117
		25.1			21.8	4,295.	Vilmorin & Klein Wanz	118
November 17							" " "	119
	40	?					" " "	120
November 17	10	9.4	8,880.(?)	8,080.(?)	?		" " "	121
October 27-28	20	20.		6,600.(?)	26.4(?)		" " "	122
November 22	20	80.	18,190.	15,916.	15.9	3,208.	" " "	123
October 24		12.	2,016.	2,000.	13.4	2,806.	" " "	124
" 18							Klein Wanz	125
		4.0			12.5	2,608.	Vilmorin & Klein Wanz	126
		8.0						127
		80.					Vilmorin & Klein Wanz	128
November 11		80.		little			" " "	129
" 23	10	84.					" " "	130
" 20							Vilmorin	131
		3.					Vilmorin & Klein Wanz	132
	20	26.7			23.6	4,458.	" " "	133
Nov. 15-16	20	40.			*34.0(?)		" " "	134
							" " "	135
October 15							" " "	136
	90	40.					" " "	137
October 20	1	1.1	145.	120.	8.7	2,192.	Klein Wanz	138
November 1	25	39.4		6,720.	13.7	3,156.	Klein Wanz & Vilmorin	139
Nov. 14-15	137	42.5	19,470.	17,150.	32.3	7,848.	Klein Wanz	140
		42.5	15,109.	12,789.	24.0	5,400.	Vilmorin	140
		82.9			17.2	3,653.	Vilmorin & Klein Wanz	141
November 1	3	8.0		300.	3.0	734.	Klein Wanz	142
		160.					Vilmorin & Klein Wanz	143

*This was certainly a good area of beets as I can testify from personal examination. By this yield, which was arrived at by digging a section of a single row, the result is much above the probable yield of an acre of like beets.

TABLE VII—SHOWING UNSUCCESSFUL OUTCOME OF SUGAR BEET EXPERIMENTS.

No.	Name.	County.	Character of soil.	Cause of failure.
1	S. J. Mann	Ashtabula	Clay	Lack of germination.
2	John Rempfer	Auglaize	Bottom	Overflowed by water.
3	G. B. Cumberland	Brown		Rain caused failure to germinate.
4	Geo. Licklider	Champaign	Clay loam	Cold, wet weather.
5	W. A. McDorman	Clarke		Destroyed by little black beetle.
6	G. H. Hortsman	Clermont	Good	Dry weather.
7	Frank Judd	"	Clay loam	Wet weather.
8	O. B. Monnett	Crawford		Overflowed by water.
9	C. F. Brandt	Cuyahoga		Sickness prevented proper attention.
10	Edward Mohn	"		Wet weather; did not grow.
11	J. J. Thieroff	Defiance		" " seed did not come up.
12	W. M. Bumgardner	Fairfield	Sand & clay	Dry weather.
13	T. P. Miller	"	Sandy	Heavy, washing rains.
14	Geo. Howard	Fulton		Planted too deep.
15	Etta R. Cunningham	Guernsey	Good	Rain caused failure to germinate.
16	Geo. N. Bogart	Henry		Plants eaten by worms.
17	E. P. Beecher	Huron		Destroyed by rain and blister beetle.
18	S. S. Reynolds	Licking	Clay	Dry weather.
19	L. H. Pool	Logan	Sandy loam	Did not germinate.
20	Geo. F. Cook	Lucas		Showers prevented germination.
21	John Neeper	"	Sandy	Cut worms and wire worms.
22	A. W. Larne	Mercer	Clay	Heavy rain.
23	W. Hoover	Muskingum	Sandy	Destroyed by black potato bug.
24	D. H. Coleman	Perry	Clay	Dry weather.
25	L. L. Nicholson	Portage	Loam	Destroyed by cut-worm.
26	W. G. Schwab	"	Clay	" " black potato bug.
27	J. D. Stutman	"	Sandy loam	Heavy rain.
28	M. C. Sweet	"	Sand	Overflowed by water.
29	C. C. Fudge	Preble		Destroyed by earth flea and blister beetle.
30	E. C. Thrall	Putnam		Not properly cared for.
31	A. Pitcher	"		Wet weather.
32	R. W. Dunlap	Ross	Clay loam	Late in planting seed.
33	Scott Finley	"		Dry weather.
34	Arthur M. Clark	Sandusky		Not cared for at proper time.
35	C. A. Veirs	Summit		Eaten up by beetles.
36	E. C. Jackson	Union		High water and potato bugs.
37	J. W. Jenkins	Van Wert		Destroyed by insects.
38	Jos. H. Harrold	Wayne		Lack of germination.
39	Dan S. Tintsman	"		Dry weather.
40	L. Baughman	"		Lack of germination.
41	A. Champloy	"	Sandy loam	Dry weather.
42	Austin Brandt	"	Yellow clay	" "
43	O. A. E. Station	"	Clay loam	Rain prevented germination at first; later beets destroyed by broad-striped flea beetle.

CULTURAL DATA RELATING TO COST OF GROWING AND YIELD OF BEETS, ETC.

One hundred and forty-three reports, upon the blanks already given, page 82, were received and are summarized in Table VI. Additional reports, numbering about thirty, stated that the trials had failed. All reports showing a lack of success, whether included in Table VI or not there entered, are made a part of Table VII, since it is conceived that failures yield information as much to be desired as do the more successful experiments. There is no reason to believe that any lack of attention was responsible for the failures generally reported. The assigned causes are given in the tabulations.

Respecting cultural data in Table VI, it is necessary to point out that the larger areas yield more valuable information. And since there is so much information yet lacking in the culture of beets as a field crop

in Ohio it does not appear wise to make many deductions from this table.

In considering the tabulated yields (Table VI) attention is called to Nos. 13, 19, 29, 37, 46, 48, 56, 82, 128, 139, 140 and 141 as illustrating reports from one-fourth to one acre areas, chiefly one-half acre, which showed upon inspection an appearance entirely in accord with the returns made. From a number of the more complete reports of larger growers we have tabulated the cost of growing an acre of beets, with the following result:

TABLE VIII.—COST OF GROWING BEETS, AS COMPILED FROM REPORTS INCLUDED IN TABLE VI.

Reporter, No.	Area.	Plowing and preparation.	Planting.	Thinning.	Cultivating and hoeing.	Harvesting.	Total.
	Sq. rods.	*Hours.*	*Hours.*	*Hours.*	*Hours.*	*Hours.*	*Hours.*
19	80	18	3	16	65	65	167
26	80	5	4	18	208	45	280
39	90	8	5	90	41	50	194
43	106	18	6	40	70	40	174
46–47	142	20	9	57	67	90	243
48	80	16	3	70	34	60	183
111	160	18	2	20	80	90	210
140	85	14	3	40	60	137	264
	823	117	35	361	625	577	1,715

In this table, as in Table VI, an hour's labor of team is considered equivalent in cost to an hour's labor of a man. The variations in time required for certain operations is in part due to a larger employment of horse labor or machinery by some cultivators than others, and in part to more favorable soil conditions in some instances than in others. In the general average it has required a little more than two hours' labor to grow a square rod of beets, or about 33 days' labor, of ten hours each, to the acre.

It will be observed that these figures are quite closely comparable with those published by this Station in Bulletin 75, p. 23.

As to the other features of Table VI, the statements of the grower are inserted without comment, save occasional question marks (?) to indicate doubt. It is recognized that there are many inconsistencies in the reports given, but they are such as appear inseparable from the method of experimentation employed. It is further desired to thank the many persons who have aided in this work and given freely of their time and labor in conducting the experiments.

OTHER CONDITIONS PERTAINING TO BEET SUGAR FACTORIES.

Aside from special machinery, which may be safely intrusted to American inventors and manufacturers, (See Fig. 1) there are still other materials required by beet sugar factories; these include especially, fuel, water and limestone. Fuel in Ohio is available as coal and coke or as natural gas. The cost of bituminous coal, as mined and delivered in carload lots, is about $1.50 per ton at lake ports. Slack coal costs less than this amount. The water supply may not, however, be profitably trans-

Fig. 1. Superior Beet Drill. (Cut by Mfrs.) This implement sows four rows at a time, the width being capable of regulation from 14 to 24 inches. Cultivators which dress a like number of rows are also on the market.

ported to any great distance, and must therefore be sought near any proposed factory site. For use in the steam boilers of a sugar factory, the same conditions hold as in steam boilers generally. A water supply with excessive mineral salts dissolved therein causes inconvenience and loss by deposits in the boiler. For washing the beets an abundant supply of water is required, although the quality is of less import. Ordinary stream or canal water, if available in sufficient quantities, may probably be used for this purpose. But for the diffusion batteries the water to be employed in extracting the beet juices, including the sugar, must be of exceptional purity. Mineral salts, if introduced here, will prevent the crystallization of sugar in the pans and the sugar loss is thereby in-

creased. The presence of calcium sulfate, calcium carbonate, and magnesium carbonate in too large quantities is deleterious. One authority asserts that water should not contain more than 10 parts of calcium sulfate in 100,000 parts of water. "The water used at Alvarado has 22.5 grains per gallon; Lehi 21; Eddy, N. Mex., 17.2 and Los Alamitos 20. Just what the extreme limit would be I am not prepared to state, probably in the vicinity of 35 or 40" [grains, solids per gallon].[1]

The following are the analyses of certain water supplies of Ohio, with source of information:

TABLE IX.—COMPOSITION OF CERTAIN OHIO WATER SUPPLIES.

	From Sandusky Bay.		Springfield—city water.
	Parts per 100,000.	Grains per gallon.	Grains per gallon.
Solid residue at 100° C	21.2	12.36	20.8
Silica	0.17	0.01	0.16
Iron oxide and alumina	0.04	0.002	.....
Calcium carbonate	10.12	5.88	1.2
Calcium sulfate	Not det.	.....	2.22
Magnesium carbonate	3.42	0.20	0.8
Magnesium sulfate	.....	.....	4.8
Sodium sulfate	.....	.....	1.7
Sodium chlorid	.....	.....	2.8

The bay water from Sandusky is from city water tap. Analyzed at Ohio Experiment Station by L. M. Bloomfield.

Springfield city water as reported by city water works [J. D. Lisle, chemist]. Obtained through kindness of J. J. Hoppes and J. C. Barnett.

Limestone is used in large quantities at beet sugar factories as a source of lime and carbon dioxide for the processes employed in treating the diffusion juices. Impurities contained in it may cause difficulties in the kilns for burning the lime as well as cause sugar loss by introduction into the juices in the refining process. Excessive moisture, magnesium carbonate exceeding about 3 percent, and silica above 1 percent are objectionable in limestones for sugar houses; iron and alumina, if in large quantities, are likewise to be avoided.

The following are analyses of Ohio limestones: —

[1] Spencer, G. L., Handbook for Chemists of Beet Sugar Houses and Seed Culture Farms. Quoted by Dr. H. W. Wiley, Special Report on the Beet Sugar Industry in the U. S., 1897.

TABLE X.—ANALYSES OF CLINTON LIMESTONE—QUARRY OF JOHN BROWN, REX, MIAMI COUNTY, OHIO [BROWN'S STATION].

Constituents determined.	1665. (1)	1666. (2)	1667. (3)	1668. (4)	1669. (5)
Water in air dry sample	0.06	0.06	0.06	0.06	0.06
Silica	0.65	0.57	0.44	4.25	0.50
Iron oxide and alumina	0.82	0.61	0.54	3.67	0.70
Calcium carbonate	91.20	93.97	96.66	73.83	97.83
Magnesium carbonate	7.13	4.36	2.44	18.84	1.10
Totals	99.86	99.57	100.14	100.65	100.19

Description of Samples.

1665—Upper layer of shaly stone, about 2 feet of cover.
1666—About 18 inches below No. 1665. This stone and above is usually rejected in lime making.
1667—Body of massive stone, 5 to 6 feet thick, below 1666.
1668—Pocket of rotten stone in 1667.
1669—Special sample of massive stone, taken 1 foot above 1668, or rotten stone.
Samples taken by A. D. Selby, July, 1898.
Analyses by R. E. Myers, at Ohio Experiment Station.

TABLE XI.—ANALYSES OF UPPER HELDERBERG LIMESTONE FROM QUARRIES OF OHLEMACHER LIME CO. AND HARTSHORN QUARRY, MARBLEHEAD, OTTAWA COUNTY, OHIO.

Constituents determined.	1676. (1)	1677. (2)	1678. (3)	1679. (H)
Silica	1.63	1.55	1.96	0.92
Iron oxide and alumina	0.15	.07	.20	0.21
Calcium carbonate	78.07	88.58	76.06	72.66
Magnesium carbonate	20.22	10.26	22.32	27.22
Totals	100.07	100.46	100.54	101.01

Description of Samples.

1676—Shaly stone, a few feet at top, west end of quarry.
1677—Best heavy (massive) stone, east end of quarry.
1678—Massive lower stone, below 1677 and separated by 2 to 3 feet of shaly stone.
1676-7-8 from Ohlemacher quarries.
1679—Hartshorn quarry—Upper 10 to 12 feet of shaly stone.
Sampled by A. D. Selby, July, 1898.
Analyzed by L. M. Bloomfield.

TABLE XII.—ANALYSES OF UPPER HELDERBERG LIMESTONE, MARION, OHIO.

Constituents determined.	1680. (1)	1681. (2)	1682. (3)	1683. (1)	1684. (2)
Silica	0.94	1.21	2.02	2.87	1.33
Iron oxide and alumina	0.14	0.39	0.20	0.34	.32
Calcium carbonate	92.32	73.16	60.02	64.25	63.20
Magnesium carbonate	7.98	26.34	37.72	32.67	35.61
Totals	101.38	101.10	99.96	100.13	100.46

Description of Samples.

From quarry of The John Evans Stone and Lime Co.:

1680—Best and purest massive stone, 6 foot layer at east end of quarry.

1681—Upper 12 feet of 27 foot stone, below No. 1680, but at west end of quarry.

1682—Lower 12 feet of heavy stone, directly beneath No. 1681.

From quarries of Morris & Christian:

1683—Blue layer of stone in heavy, 27 foot layer.

1684—The 10 feet of massive stone above No. 1683.

Sampled by A. D. Selby, July, 1898.

Analyzed by L. M. Bloomfield.

DISEASES AND INSECTS ATTACKING THE SUGAR BEET.

THE LEAF SPOT FUNGUS (*Cercospora beticola* Sacc.)

As already stated, the leaf spot disease was prevalent very generally on the sugar beet plots grown the past season. In certain places, especially when the beets were upon ground in which beets had been grown the previous year, this fungus destroyed nearly or quite all the leaves as early as June; more commonly the maximum injury was inflicted late in August and early in September. It was not at all uncommon, when inspecting the beet fields, which was done chiefly from October 3 to October 14, to find the dead leaves still hanging about the beets and new leaves developing; also to observe a small number that had suffered complete destruction of the leaves. In such beets the top of the root was hollow and more or less decayed. I am thoroughly convinced that the leaf spot fungus caused a marked reduction in the sugar content of most of the beets grown in Ohio in 1898. During seasons like the one that has just passed this fungus is liable to prevail.

It must be borne in mind that the beet leaves, under the influence of sunshine, produce the sugar which we desire to secure, and that any interference with the normal function of the leaves must result in diminished sugar content of the beet root. It may further be observed that the injuries of this fungus have been overlooked by several growers. They have spoken of ravages by blister beetles when we were together, inspecting the beets, while very slight injury from that source could be

observed and the leaf spot had attacked all parts of the beet area. This fungus may be known by the numerous spots it causes in the leaves; these have a light, commonly nearly white center when the fungus matures, surrounded by a darker border; the whole of one spot being $\frac{1}{8}$ in. in diameter.

THE BROAD-STRIPED FLEA-BEETLE AND BLISTER BEETLE.

By reference to causes of failure in unsuccessful beet plantings, p. 116 it will be observed that the beets were in some cases "eaten up by bugs". This happened in a sense to the beet field at the Experiment Station. The cause of the injury here may possibly compare with other cases elsewhere. After difficulty in germination, owing to packing of earth by showers, the beets were up, having two leaves, and showed a fair start June 20. About June 25, during rather dry weather, the plants were attacked by what the Station Entomologist identified as the broad striped flea-beetle, *Systena tæniata* Say. The seedlings readily succumbed and appeared to dry up. In two or three days all the plants were destroyed. Other growers reported like conditions, but in some cases there was no identification of the insect in question.

The blister beetles ("old fashioned potato bugs") according to reports, also inflicted more or less injury to the beets, later.